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Handling of Heavy Materials

WHAT is attempted to be shown in this article is the versatility of materials-handling equipment and the way in which one type doing a certain class of work may feed into another type handling the work somewhat differently. In detailing briefly the various methods used to handle materials in a large manufacturing plant, there is no idea that this system can be copied directly by the great group of metal-working plants forming the backbone of THE IRON AGE readers. In other words, the article is distinctly suggestive of adaptations which may be made within any given plant. It is indeed fortunate that materials-handling equipment may thus be made to fit into almost any class of manufacture.

MORE than 100 acres of floor space constitutes the area of the manufacturing buildings at the Eddystone plant of the Baldwin Locomotive Works on the Delaware River in Pennsylvania. Intercommunication among these several buildings is largely by means of standard-gage railroad trackage, of which there are more than 25 miles within the works. Further intercommunicating trackage consists of narrow gage (24 in.), of which the plant has about 10 miles.

Over 300 cranes are in service, including electric overhead

traveling cranes, overhead cranes with electric hoists and hand traverse, overhead cranes with hand operation throughout and jib cranes. Some departments make extended use of skid platforms, and electric lift trucks for handling them. This service is entirely within doors, as there is no provision for running the lift trucks from building to building.

Tote boxes of various sizes, descriptions and uses are employed throughout the plant. Some of them are big enough to hold several tons of steel scrap or corresponding bulk of rubbish. Others are

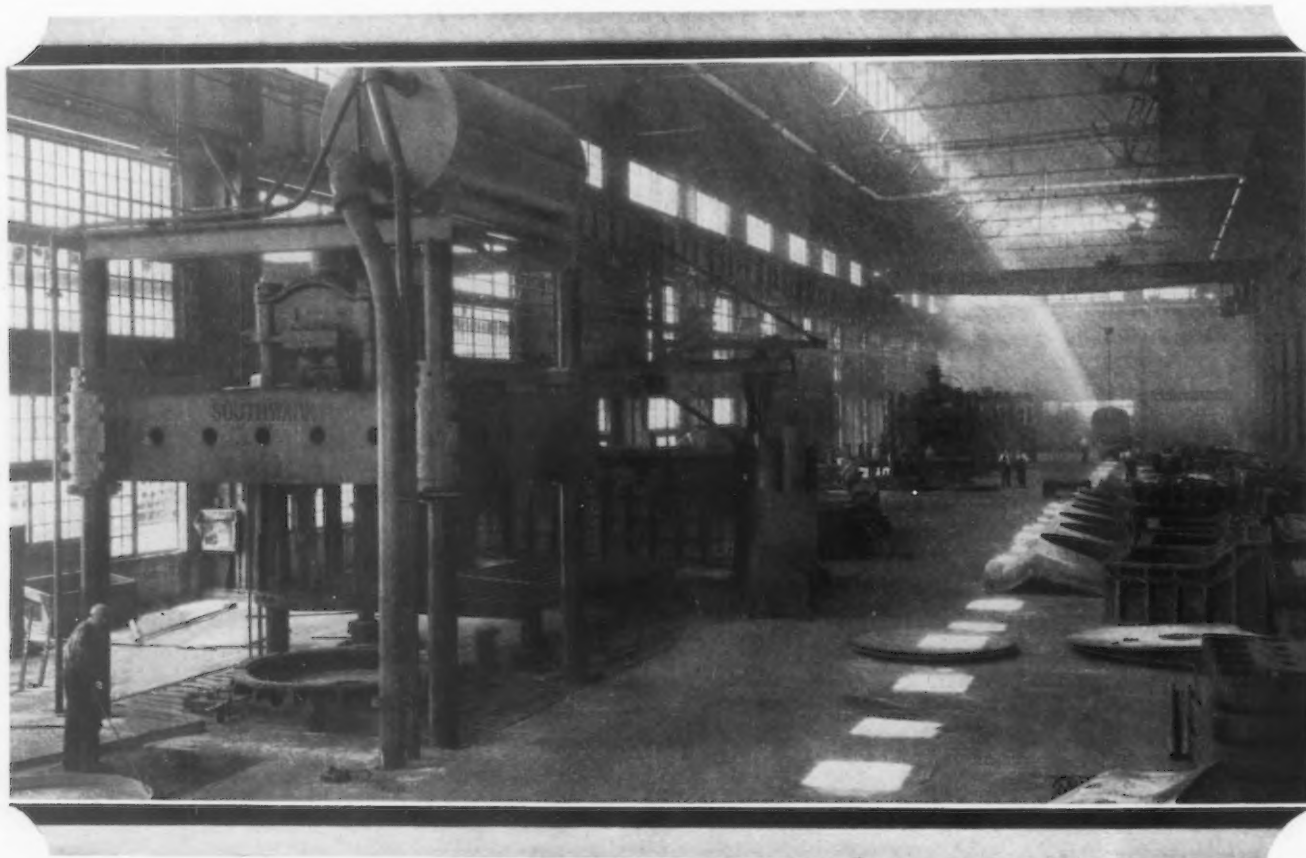
IN the Large Machine Shop Adjoining the Locomotive Erection Shop Are Both Overhead Traveling Cranes and Almost a Forest of Jib Cranes, to Handle Pieces On and Off the Machines. In foreground, a truck moves parts from one department to another. At extreme right is one of the large tote boxes



small enough to be trundled on hand trucks. Between these two extremes the dimensions are various.

For foundry work, particularly in the brass foundry, there is an extensive system of overhead suspended monorail for handling ladles of metal, molds and other weights. There is also in most of the buildings an arrangement for transferring materials from one bay to another, consisting principally of short lengths of track, either narrow or standard gage, upon which trucks are operated. The latter may be pushed by dinkey engines or by Fordson tractors, as occasion

Generally speaking, materials are received at one end of a shop and moved toward the other end, while being subjected to the various manufacturing processes. Plates coming into the boiler shop, for example, first reach the lay-out gang. They are handled entirely by overhead crane, being picked up by means of hooks and rigs designed for this special purpose. From the lay-out station they are transported, again by crane, to the drilling machines, where various holes of specified diameters are drilled in them. After being drilled, the edges are all planed to



F LANGE Shop, Where Cranes Do Most of the Lifting. Some of the lighter pieces are moved into and out of the machines by the manual use of bars

requires. Sometimes they are hauled over by a crane operating through tackle on the floor. In other cases, especially with light loads, man-power moves them along the tracks, a few feet.

Motor-truck service is considerable, particularly where material of moderate weight has to go from one building to another at a distance. The company operates 19 five-ton trucks and maintains a garage where these and other motor-driven units are kept in repair.

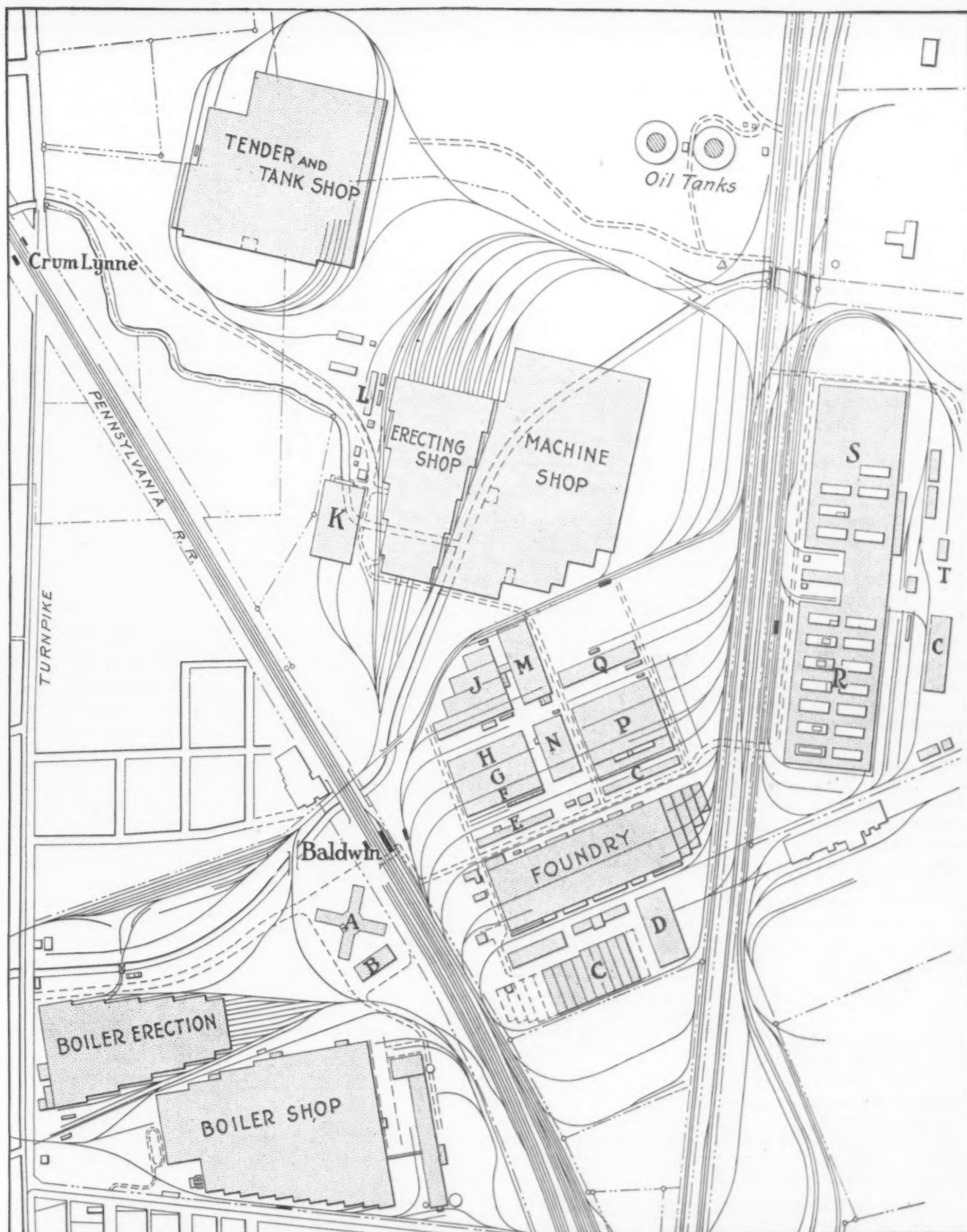
There is a distinct contrast between the methods here outlined and those which were in vogue in the plant in the heart of Philadelphia, now abandoned. Except as required by certain processes, there is here practically no vertical movement of materials. Elevators are not used; buildings are one story in height, although some of these stories are very high. Consequently, the materials are handled with a minimum of effort, a minimum of transfer from one piece of equipment to another, and, so far as is possible, along straight lines proceeding toward a definite end.

a smooth surface and the required bevel, handling again being by overhead crane. Thence, the plates are delivered to the bending

rolls, where they are given the required curvature before passing to the riveting stations on the way to the erecting bay.

Special short-span and short-run cranes serve the riveting machines in the boiler shop, there being a separate crane for each machine. After this work has been performed upon the boiler shells they are placed upon railroad cars and shifted over to the boiler erecting bay where the various inside and outside fittings, except for the tubes, are put in place.

In this case, after the boiler is once landed in its position, it is not moved except to be turned over during the further progress of this work. The various parts are brought to it, however, either by overhead electric crane or by means of a truck operated on the floor and hauled perhaps by a Fordson tractor. Boilers complete, except for the tubes and for the outside lagging, are then sent on standard-gage railroad cars



LAYOUT of Baldwin Plant at Eddystone, Pa. Buildings designated by letters are as follows: A, office, seven stories; B, cafeteria; CC, pattern storage, with future bays; D, pattern shop; E, spring shop; F, hydraulic shop; G, smith shop; H, hammer shop; J, machine shop No. 2; K, pipe and jacket shop; L, power house; M, machine shop No. 3; N, power house and machine shop No. 1; P, east smith shop; Q, machine shop No. 4; R, cylinder machine shop; S, frame machine shop (the building housing R and S is 1800 ft. long); T, carpenter shop

to the locomotive erection shop some distance away.

Meantime, engine frames and engine cylinders are being made, from the castings, in the two ends respectively of the large cylinder and frame shop. In both cases the large castings are brought in at one end of the shop or department and are processed as they move from one station to another toward the exit. So far as possible straight-line motion prevails. Handling is almost entirely by overhead electric traveling cranes. Hauling from one bay to another, however, is done on broad-gage tracks, bringing the part within reach of the crane which is next to pick it up. When these units are completed they are transported, again by railroad cars, to the locomotive erecting shop for working into a complete locomotive.

Forgings such as are not purchased outside are made in the smith shops located between the boiler shop and the frame and cylinder shops. Handling here is largely by means of jib cranes, together with overhead traveling cranes, with the addition of such trucks on rails or otherwise as may be required for the different parts. Large tote boxes are employed here for the smaller pieces and other carrying devices for various shapes of materials being processed.

Both railroad cars and motor trucks are employed to transport these parts, as required, to the locomotive erecting shop and the tender shop.

Castings made in the foundry are handled mostly with the overhead cranes, the size and shape of the unit governing the character of the handling process as such. Railroad cars are used for taking the largest units away from the foundry to the machine shops where they are to be finished.

Assembling Wheels and Axles

WHILE all this work on the locomotive has been going forward the wheel and axle shop is engaged in making and assembling both the driving wheel units and the leading and trailing truck units. Handling here

again is mostly by means of overhead crane, but there are standard-gage and narrow-gage tracks running into the shop and others for transfer from one bay to the next. The furnace used for heating tires for shrinking on the wheel center is served by an overhead crane. The completed wheels, already on their axles, are then transferred by the same crane to wheel lathes for final truing.

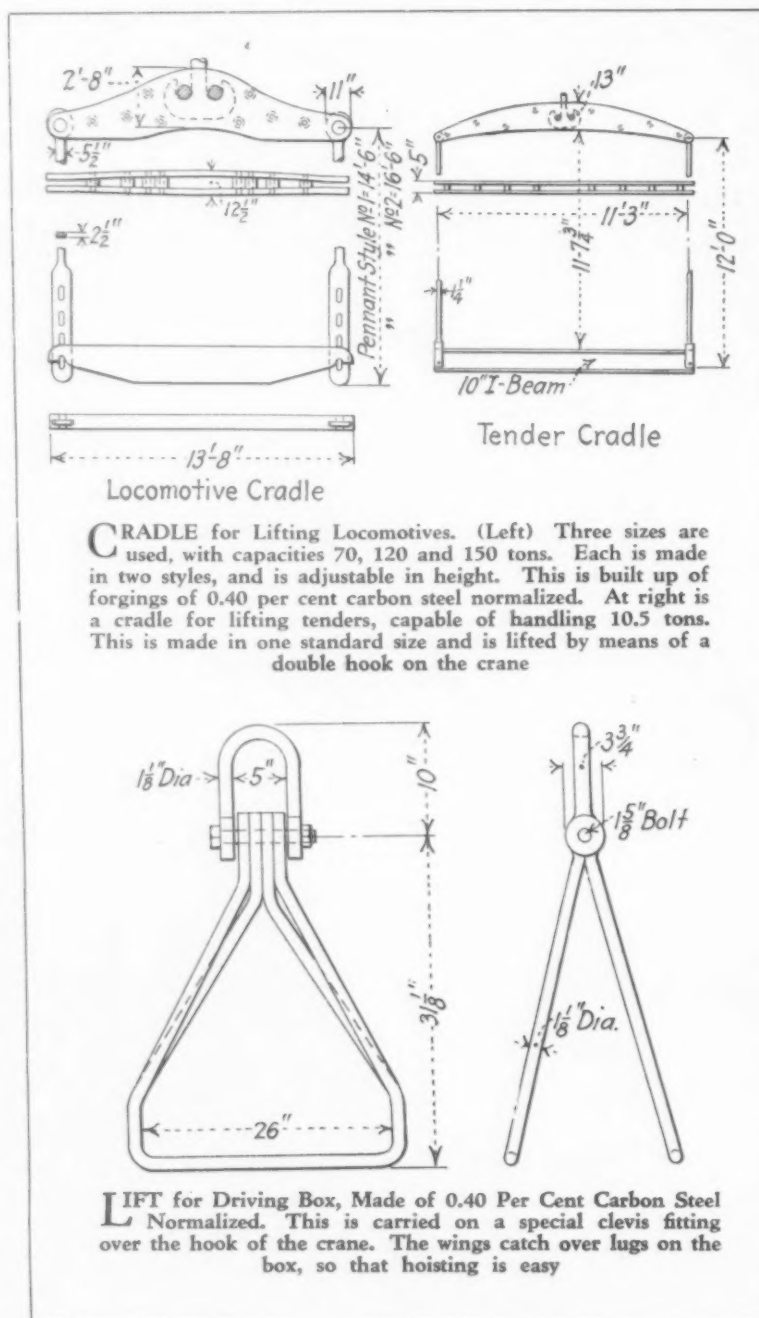
Alongside the wheel and axle shop is the box shop, where journal boxes are made both for locomotives and for tenders. The overhead cranes in this shop have relatively light loads to handle and are therefore light cranes of rapid movement. They have rigs in the form of broad loops for picking up the boxes, designed so that each pair will fit over projections on the box and lift it readily and without danger of dropping it.

Throughout the plant similar rigs are employed for various purposes and are of various types. Some are steel wire rope slings; others are spun yarn slings—in the boiler shop, particularly—while others are special forms designed for the particular job in hand. The spun yarn slings have the advantage, for boiler work, that they will not readily slip on the smooth boiler surface, especially when brought into contact with rivet

heads. All slings are inspected monthly and chain slings and lifts are annealed yearly. This inspection is rigidly carried out.

Similar arrangements for handling materials are found in the spring rigging shop, the brake equalizer shop and the various other shops making parts for the locomotive. The rod shop in particular has a veritable forest of jib cranes for handling the rod blanks and completed rods to and from the various machines where they are planed, bored, etc.

To feed the erecting shop with the materials needed in the course of building up the engines the large machine shop alongside, in which the rods, pistons, link



CRADLE for Lifting Locomotives. (Left) Three sizes are used, with capacities 70, 120 and 150 tons. Each is made in two styles, and is adjustable in height. This is built up of forgings of 0.40 per cent carbon steel normalized. At right is a cradle for lifting tenders, capable of handling 10.5 tons. This is made in one standard size and is lifted by means of a double hook on the crane

LIFT for Driving Box, Made of 0.40 Per Cent Carbon Steel Normalized. This is carried on a special clevis fitting over the hook of the crane. The wings catch over lugs on the box, so that hoisting is easy

(Concluded on page 1582)

Alloy Steel Guns Cast Centrifugally With Mounts of Welded Parts

IN an address that electrified his listeners, Major-General T. C. Dickson, commander of the Watertown Arsenal, Watertown, Mass., recounted the revolutionary progress that has been made recently in the production of guns. He presented a large number of lantern slides before about 800 members and guests of the Cleveland Engineering Society, in the ballroom of the Hotel Winton in Cleveland, Tuesday evening, May 13. He was introduced by Col. Frank Scott, chairman of the board, Warner & Swasey Co., Cleveland.

His story of how guns are now made of centrifugally cast alloy steel, are cold-worked so as to increase their physical properties and are mounted on carriages and other apparatus built up of successfully welded members, instead of steel castings, was a most interesting one. It was told entirely by running comment on lantern slides.

Cold-Working of Gun Steel Improves Properties

GENERAL DICKSON prefaced his account with a recital of his familiar work on the cold-working of forged guns by hydraulic pressure. Instead of making a built-up muzzle of separate forgings shrunk on each other, the Watertown Arsenal, under the general's direction, succeeded some time ago in taking a solid piece of steel, machining it to the proper size, and then by cold work bringing it to its final shape. The one piece has properties superior to the assembly of separate forgings.

In cold-working, the one-piece muzzle or gun is subjected to a hydraulic pressure up to 120,000 lb. per sq. in., so that the interior bore or diameter is increased 6 per cent, but the outside diameter only a small amount, about 0.80 in. This process, carried out in specially built apparatus, increases the elastic limit of the steel. By suitable heat treatment after this hydraulic cold working, the elastic limit is still further increased.

Molybdenum Steel Guns Cast Centrifugally

LATER developments are sensational in nature. At present, some of the smaller guns are being cast centrifugally in a special machine to a suitable shape, ap-

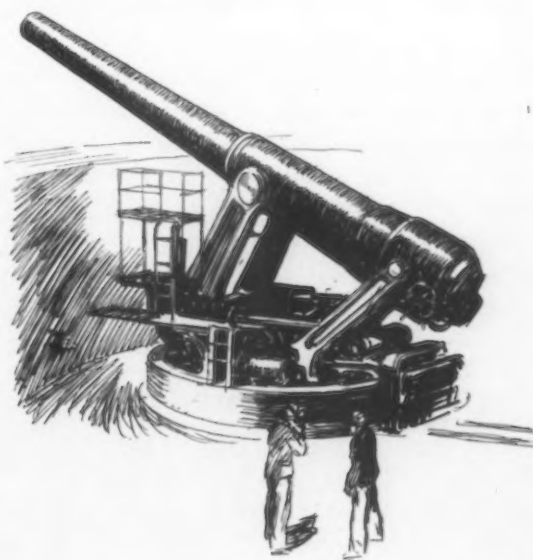
New and Rapid Process of Making Superior Guns

Molybdenum Alloy Steels Especially Suited

Cold Work Applied by Hydraulic Pressure Insures Better Properties

Gun Carriages of Welded, Structural Parts Checked by X-Ray

Lighter Supports for Guns and Greater Ease of Mobility



proaching that of the final gun. The steel is melted in an Ajax-Northrup high-frequency furnace and poured into the rapidly revolving mold, at regulated speeds and temperatures, directly from the furnace itself, which is transported to the mold. The grade of steel used is a molybdenum alloy steel, containing 0.35 to 0.40 per cent carbon and about 0.40 per cent molybdenum. Occasionally a small percentage of vanadium is used. Removed from the machine at a heat above its recalcence point, the piece is properly heat treated.

A feature of the centrifugally cast piece, emphasized by General Dickson, is the fact that the carbon content of the inner bore is higher than the outside of the piece—a condition especially desirable and easily recognized by ordnance men. Just why this segregation takes place was not explained. It was also emphasized that the schims and other impurities collect on the inside of the hollow casting and are easily removed. The superior structure of the metal was called attention to and illustrated. It was stated that defects that unavoidably collect in small measure on the outside are easily machined off.

The next step is to give it the hydraulic cold-working treatment. The casting is placed in a special container which, briefly, is a metal jacket, the dimensions of which are those desired in the finished gun. At this point the gun is subjected to the same hydraulic expansion used formerly on forged guns, with the same or better physical properties resulting.

Advantages of the New Process Are Many

Advantages of these new developments are many, said the general. In particular it is possible to make more guns in less time by this process and at less cost—an important consideration in time of war. One casting machine can produce at least three guns while one is being made by the forging method. The excessive machining and boring necessary on forgings is largely eliminated and the physical properties of the product are superior. There is also less likelihood of there being defects in a product thus made than from the older process. And the superiority over the built-up gun is evident, in his

opinion. Several types and sizes of guns have been made by this process, said the speaker.

Gun Carriages of Welded Structures

WHEN General Dickson launched into the subject of welding as applied to army ordnance, he waxed even more enthusiastic. He demonstrated that, by the use of proper welding apparatus and rods, gun carriages of several types are being produced by built-up structural members joined by welding, so that the cumbersome and heavy cast steel carriages are eliminated. He presented on the screen many examples and described the advantages.

But the role of the X-ray in this work was carefully explained. Perfection of the welding process and reliability of the welded products are possible, said the lecturer, only by careful checking by X-ray examination. He showed several examples of good and bad welds.

The art has been so perfected that the army can now be supplied with light apparatus that is not only reliable in supporting guns in action, but is easily transportable over wide territory. He explained how, by suitable structures, guns are being transported on commercial trucks to almost any desired location. A welded tractor equipment has been developed which, applied to the six wheels of a truck, enables it to easily negotiate the most difficult terrain. The caterpillar equipment is so simple and yet so light that it can be removed or put on any large commercial truck. With the new welded supports or carriages, guns of various sizes and types are ready for

immediate action in almost any locality. The contrast between this and the older artillery equipment was vividly pictured.

Why Molybdenum Steel Is Preferred

SEVERAL questions were answered by the general after the lecture. Asked why molybdenum steel is used, the answer came back that it is the best alloy steel possible for the severe requirements that have to be met. The speaker pointed to the excellent physical properties, particularly the elongation and reduction of area, as revealed by tests put on the screen, including the tensile properties.

As to whether any special welding process was used, the lecturer said: "By no means—regular commercial equipment is purchased, but the work must be regulated by the X-ray and the welders carefully trained."

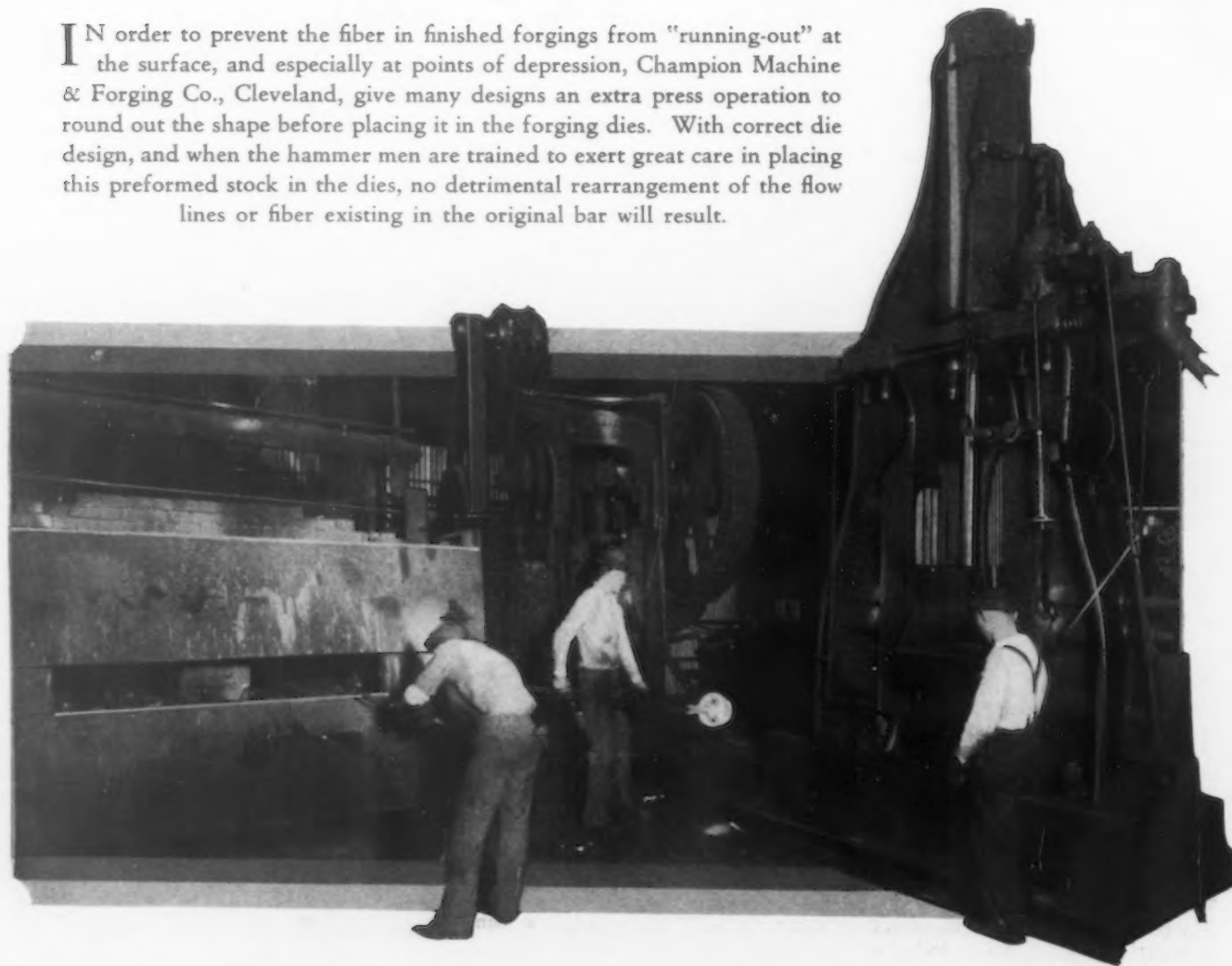
Large High-Frequency Furnaces to Be Used

IT was explained in reply to another question that the largest gun made by the centrifugal process weighed about 8000 lb. The capacity of high-frequency electric equipment is not yet large enough to meet this demand, it was pointed out, but General Dickson stated that large melting furnaces of this type are on order, up to 5000 lb. and over, which will simplify such melting problems.

The general stated that the one-piece, centrifugally cast alloy steel gun, hydraulically cold-worked, has come to stay and predicted large things for it "in the next war."

Fiber in Forgings Controlled by Extra Operation

IN order to prevent the fiber in finished forgings from "running-out" at the surface, and especially at points of depression, Champion Machine & Forging Co., Cleveland, give many designs an extra press operation to round out the shape before placing it in the forging dies. With correct die design, and when the hammer men are trained to exert great care in placing this preformed stock in the dies, no detrimental rearrangement of the flow lines or fiber existing in the original bar will result.



Proper Sand for the Steel Foundry

Reclamation Now Quite General—Sand Called "Most Potent Variable"—How Hot Metal Penetrates the Mold

SAND was the main topic at the various meetings of steel foundrymen at the annual convention of the American Foundrymen's Association in Cleveland, May 12 to 16. There was but one technical session, at which four contributed papers were read and discussed. Besides this there was a round table luncheon and three shop operation courses. Some of the main features of these events are discussed in the following paragraphs.

It is rather unusual for a steel foundry technical session to be absorbed by the one topic—sand. Yet this was the situation this year. Usually some metallurgical or melting process topics are introduced. Yet sand is a vital raw material in successful steel foundry operations and the three papers presented were of value.

Reclaiming Steel Foundry Sand

TO what extent old sand can be recovered was discussed by M. D. Pugh, Illinois Testing Laboratories, Chicago, in a paper "Reclaiming Steel Foundry Sands."

There are two ways by which the steel foundry can reduce or control the consumption of sand:

- 1.—By reclamation
- 2.—By conservation

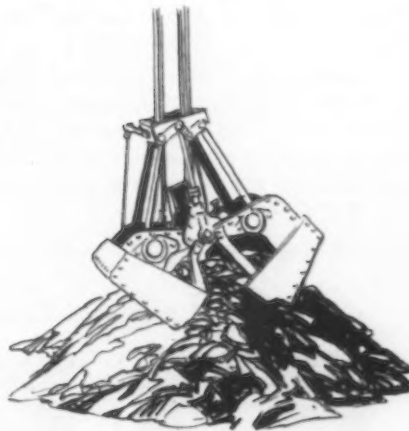
Reclamation is defined as the recovery of good sand from refuse or waste sand; conservation, as the removal of undesirable material from sand before it becomes so contaminated that it is unfit for molding use.

For such foundries as do not have reclaiming systems, the average consumption of sand is about 1500 lb. of new sand for each ton of castings produced. The loss is due mainly to the effect of high temperature of metal poured into the molds, which breaks up the silica grains, fuses some particles and destroys the active bonding material.

Lack of uniformity of sand grains and variations in the amount and distribution of clay bond, the quality of the clay, the amount of water used and the temperature of the steel when cast are reasons why sands burn in. The most important of these is uniformity and size of grain.

Two Reasons for Failures of Reclaiming

Mr. Pugh offers two main reasons for failures of reclamation: Lack of proper attention to condition of sand when it goes to the reclaiming unit and lack of equipment suitable for efficient removal of detrimental materials. He insists that a properly reclaimed sand can be used to a very large extent as facing to replace new sand and that, for a large percentage of steel foundries, a sand that passes a 20-mesh testing sieve and reclaimed on a 60 or a 65-mesh sieve is most desirable—also that, with the



proper equipment, 50 per cent to as high as 75 per cent of former sand consumption can be saved.

Sand the Most Potent Variable

ANY paper from the pen of George Batty, technical director, Steel Castings Development Bureau, Philadelphia, is always listened to with interest. This time his subject was "The Most Potent Variable."

In the course of his work, Mr. Batty said, he has to investigate certain troubles of producers of light steel castings and has come to the conclusion that approximately 95 per cent of the defects, as investigated, have resulted from some deficiency of the mold rather than from any inherent shortcoming of the metal. The molding sand is, therefore, the chief variable.

Grain size is very important, says the author. For green sand work the ideal grain shape is a sphere, and the more nearly the grain shape approximates the sphere, the more suitable is the sand as regards grain shape for green sand molding. Irregularity of grain size is considered undesirable because the "filling" effect of small grains in what normally would be interstices between the larger grains.

Factors in Molding Sand to be Considered

Molding sand factors that should be considered are: Area to be covered by bond; type of bond; bond diluent; interparticle atmosphere; proportion of water; ramming, density and mold resistance. As to binding, it is the practice of Mr. Batty's bureau to use binders of the bentonite type in association (in some cases) with cereal binder. It has been found quite practicable, he says, to use 100 per cent reclaimed sand as the basis of the facing sand mixture by combining a screening and a pneumatic system for cleaning the sand after each cycle of use.

There is a valuable discussion by Mr. Batty of factors in blows and pin-hole penetrations. He has some interesting explanations of the causes of pin holes.

As to the influence of temperature upon the molding media, Mr. Batty says that, on quite large castings, the pouring temperature may not safely be below about 2700 deg. Fahr. and it is comparatively rare that the actual pouring of metal from hand shanks or bull ladles is conducted at a temperature higher than 2950 deg. Fahr. A difference of 50 deg. in pouring temperature is, therefore, quite a considerable proportion of the operative fluid range of steel for castings and the question of sand con-

trol is tied up with the question of temperature control of metal.

Metal Penetration of Molds

A PAPER that elicited general commendation was "Notes on the Behavior of Sand Molds in Steel Foundries," by Paul L. Goodale, chemist, Commonwealth Division, General Steel Castings Corporation, Granite City, Ill.

Attention is called to the importance of the characteristics and properties of core surfaces when casting steel against them. An oxide slag is formed when the incandescent metal of the surface of the casting burns in contact with the air. This slag, being very fluid at pouring

whose reputation in steel foundry practice is well recognized. One must study the mechanism of the action of sand apart from its ability to hold. Wastage of sand 12 to 14 years ago was large; then hand screens were used in reclaiming some sand. It is quite easy to use reclaimed sand, said Mr. Melmouth; it is technologically sound, but there are practical difficulties. The quantity of facing sand is important but this is only part of the solution. A mechanism or scheme to control the egress of gases from behind a portion of the mold is advisable and desirable.

The finer the sand, the better the casting, said R. A. Bull, director, Electric Steel Foundries' Research Group, Chicago. Fines in molding sands are often destroyed binders and not fine grains of sand. He agreed as to the influence of fines—not the total quantity but the nature of them. A mold with a hard face and with increasing permeability away from the chilled mold surface is what is desired.

It was suggested by A. H. Dierker, Ohio State University, Columbus, that the peeling off of sand from a steel casting under proper conditions is due largely to a contraction of the sand itself and anything that will aid this contraction is desirable.

Testimony from A. H. Wilson, Wheeling Mold & Foundry Co., Wheeling, W. Va., was to the effect that the closing up of the surface of the sand like an ingot is desirable. In his plant 65 per cent of the output is large steel rolls, and there is often much trouble with steel entering the sand of the mold, as illustrated by Mr. Goodale's paper. It is often necessary to machine off sand from the surface of alloy steel rolls.

Round Table and Shop Operation Discussions

OVER 100 steel foundrymen attended the round table luncheon at the Hollenden Hotel. It was presided over by W. J. Corbett, Fort Pitt Steel Casting Co., McKeesport, Pa.

Here again sand was the main topic. Some of the subjects considered were mold washes, green sand mixtures that do not require skin drying, sand control in a small foundry, sand preparation and its relationship to surface condition of castings and so on.

A representative of a large foundry said that no new sand is used at all in his plant. Reclamation of old sand is complete and successful and the foundry's output runs into large tonnages. A successful equipment is used. Influence of hot sand was discussed and it was agreed that all hot sand must be cooled before use, if proper results are to be realized.

All of the three shop operation courses in steel founding were well attended. One was devoted to chipping, grinding and riser removal, another to core room practice and the third to practical aspects of heat treating, but most of the discussion was academic and instructive in character.

"Battledeck Welded Floor Construction" was described by Lee H. Miller, chief engineer, American Institute of Steel Construction, before the American Welding Society in New York in April. This method welds plates to the top flanges of steel floor joists, and makes the whole floor panel act as a unit. Notable savings in dead weight and head room have been predicted and attained in those structures where it has been utilized, notably in a large school, garage and bridge. Studies made by Bethlehem Steel Co. indicate that costs of erection of open-hearth floors of this sort are about the same for welding as for riveting; in two plants to be erected soon the saving will come from eliminating the necessity of punching and countersinking 350,000 rivet holes in the plates.

Authors of Papers on Foundry Sand



M. D. Pugh



George Batty

temperatures of steel, penetrates readily in between the sand grains of an open core and forms some iron silicate by action with the sand. In dry sand cores some of the oxide is reduced back to iron, forming a mass of magnetic material.

In attacking the problem that confronts those who cast steel against sand, it had been thought that the sand was not refractory enough and much time and effort were spent to obtain more refractory mixtures. Mr. Goodale suggests that oxide formation and action should not be overlooked in attempts to solve such problems. Spraying of metal to close core surfaces, exclusion of air, displacement with inert gases and oxidizing agents incorporated in sand mixtures (because higher oxides adhere less tenaciously than does ferrous oxide), are some of the expedients which suggest themselves to the author as meriting investigation.

Steel Foundries in Australia

An interesting exchange paper from the Bureau of Steel Manufacturers of Australia entitled "Steel Founding as It Is Practiced in Australian Plants," by Daniel Clark, Newcastle, N. S. W., Australia, was presented by title. Foundries of that country are almost entirely engaged in jobbing work for mines, quarries, tramways and railroads.

Discussions

IN the discussion that followed these papers the consensus of opinion seemed to be that too much importance is likely to be attached to small sand or fines. This was the statement of F. A. Melmouth, Detroit Steel Castings Co., Detroit, who recently came from England and

Use of Nickel as Ferrous Alloy Gains

Sales to Steel Makers Gained Over 434 Per Cent in Six Years—Ni-Mo Steels a Recent Development—It Benefits Cast Iron

BY CHARLES MCKNIGHT*

EARLY development of nickel steels was, it is well known, in connection with ordnance and armor. No effort was made by the producers to sell nickel prior to the beginning of the last decade because the demand for military purposes equaled the supply. During the war, however, the demand was quickened to such an extent that production was doubled and redoubled so that the armies and navies of the world could procure alloy steel not only for their weapons and defense but also for the automobiles, trucks, aircraft, tanks, etc., that were equally necessary to the prosecution of the war.

At the conclusion of hostilities it was unhappily apparent that there was a large production of nickel with no market except the automotive field, which was itself in a slough of despond. The average monthly sales of nickel in 1919 were little more than one-tenth the sales in November, 1918. Nickel was a drug on the market and the outlook was gloomy indeed.

Facing such a situation, it was necessary to initiate an intelligent program aimed, first, to cultivate and recultivate industries where nickel was already established and, second, to open up new fields in which nickel had not been used, to the end that the collapse of a single great industry, such as the automotive, would not be fatal.

Nickel Steels Now Widely Used

THAT this effort has been successful is demonstrated by the growth in the use of nickel steels. From 1923 to the present the steel production of this country increased 22.46 per cent. Production of alloy steels increased, in the same time, 65.88 per cent. But the production of

*Abstract of paper read before American Iron and Steel Institute, New York, May 9.

nickel alloy steels, gaged by the only authoritative index, sales of nickel to steel makers, increased 434.45 per cent. This success is a tribute to the consumer of nickel as well as to the producer.

Today nickel steel, it may truthfully be said, is the most used alloy steel as well as the oldest. This preponderance is in great part due to two characteristics that make the element, nickel, almost unique among alloys for iron and steel. First, nickel alloys with iron in all proportions; second, there is no loss of the metal by oxidation during melting processes. This latter fact renders the manufacture of nickel alloy steels more exact and more economical, as less alloying material is initially used and eventually the nickel in scrap, crop ends, etc., can be fully recovered on remelting. Nickel, once purchased, is never lost.

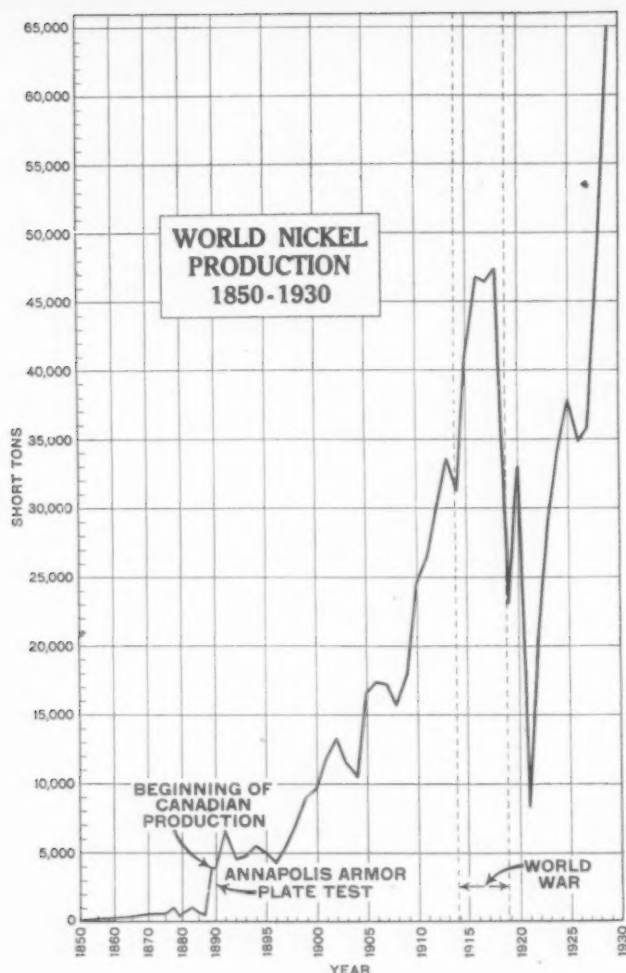
Nickel is used for alloy steel making either alone or in combination with other alloying elements, such as chromium, molybdenum, vanadium and manganese. Most of the S. A. E. alloy steels are nickel-bearing and an idea of the widespread use of nickel steel in the automotive industry can be gained from the fact that every automobile uses some nickel steel, the amount running from 1500 lb. per car down to a few pounds.

Ni-Mo Steels a Recent Development

The only recent development in structural automotive steels is that of nickel-molybdenum steels. Molybdenum, its value as an alloy recognized during the war, confers desirable properties on steels and is an ideal companion-alloy to nickel. Some four or five years ago the largest manufacturer of roller-bearings began to use a nickel-molybdenum carburizing steel for his product and in a



EDUATED at the Lawrenceville School in New Jersey and at the University of Pittsburgh, Charles McKnight first became associated with the steel industry when 14 years old as a sample boy at the Midland Steel Co., Pittsburgh, during summer vacations. Employed at various times by several steel companies in the Pittsburgh district, he left the Carbon Steel Co. as works manager in 1922 to go with the International Nickel Co. at the inception of its program to broaden the commercial uses of nickel. He became identified with the development work on alloy steels and is still in that work. He regards as his most creditable performance the development of nickel steel for boilers and of low-carbon-nickel forging steel. He served in France with the American army from 1917 to 1919. His last rank was major of field artillery. He was born in Sewickley, Pa., of a family long identified with the steel industry. The first iron produced west of the Allegheny Mountains was made by an ancestor who owned the first foundry in Pittsburgh. He is the author of various papers before technical societies and a member of leading American technical associations.



short time the use of the nickel-molybdenum and nickel-chrome-molybdenum steels became widespread in the automotive world.

Aviation, child of the automotive industry, adopted nickel steels almost in its entirety since such steels are used in the construction of over 95 per cent of aircraft motors. Such vital parts as crankshafts, connecting-rods and piston-pins, valve push-rods and rocker-arms are made from heat treated nickel steels and, in addition, the cylinder heads and pistons are often of an aluminum-nickel alloy having high strength combined with low weight and rapid heat transference.

Transportation offers the greatest field for alloy steels because strength coupled with lightness and reliability is imperative. Yet until recently the railroads have lagged in adopting such steels. One of the most interesting and perhaps one of the most important of the newer developments is the use of nickel steel for boilers. The present tendency toward higher boiler pressures has made the designer turn to other materials than carbon steel for boiler construction.

In 1926 the Canadian Pacific Railroad adopted nickel steel for boilers, and succeeded in increasing the boiler pressure 25 per cent without any increase in weight. The steel employed, a 3 per cent nickel steel with a minimum tensile strength of 70,000 lb. per sq. in., was approximately 35 per cent stronger than carbon steel, and therefore the factor of safety, in spite of the increased pressure, was actually higher than before.

Two Reasons for Use of Nickel Steels

Nickel steel is preeminent in this field for two reasons. First, the characteristics of steel at room temperatures and boiler temperatures are very different. At boiler temperatures nickel steel is stronger, has a much higher im-

pect strength and resists embrittlement much better than other steels. In other words, it is not so subject to the dread "blue brittleness." Second, boiler plate *per se* is a low-carbon material and nickel, not being dependent on carbon for its alloying qualities, confers higher properties on a low-carbon steel than any other alloy.

Nickel in Railroad Steels

IN the development of locomotive parts the tendency has been toward higher and higher tensile strengths. For forgings wrought iron with an ultimate tensile strength of about 45,000 lb. per sq. in. was originally used. This later gave way to carbon steel with a strength of 75,000 lb. per sq. in. and carbon steel, in turn, has quite generally given way to alloy steels with tensile strengths of 90,000 lb. per sq. in. or higher. As the strength of the steels employed has been progressively raised, so has the carbon content. Wrought iron, of course, contains comparatively little carbon; the forging steels of today run in the neighborhood of 0.45 to 0.50 per cent carbon. It has perhaps been natural to reason that, if failures occur with one material, stronger material is indicated. This logic can be questioned. It seems that too much attention has been paid to strength and not enough to the characteristics which indicate toughness. The practical limit of strength, however, has now been reached for normalized forgings. No matter what alloy is used, it is not possible greatly to increase the strength over that now being attained.

In this dilemma recourse was had to the other extreme, and comparatively low-carbon (0.15 to 0.30 per cent) nickel steel was introduced to the railroads and is now being widely used as a material for stressed forgings of locomotives. Such material will have a slightly lower ultimate tensile strength but the toughness, as indicated by the elongation, reduction of area, and resistance to impact, is greatly increased. Impact values are illuminating. The Izod value of this steel averages about 50 ft.-lb. against the average of about 18 to 20 ft.-lb. for alloy steel forgings of higher carbon for the same purpose. This steel is peculiarly suited for axles and crankpins.

Heavy Forgings Need Nickel

A brief word on heavy forgings. It was in this field that nickel steel first demonstrated its superiority and it is in this field still a standard. As regards composition, the nickel and nickel-chrome are being supplemented by the newer nickel-molybdenum and nickel-chrome-molybdenum steels. The heat treatment of these forgings, which was formerly either annealing or treating by the quench-and-draw, is now giving way to the normalizing treatment very largely, although there are still a large number of forgings which are best treated by quenching in some liquid medium.

Nickel Benefits Cast Iron

MANY years ago experiments were carried on with nickel in cast iron but results seemed to indicate that nickel was detrimental to iron. Eventually, the effects of nickel on cast iron were investigated thoroughly by laboratory methods and it was found that the apparently bad results obtained with nickel were due to the complex nature of cast iron and the failure to recognize the effect of other elements when nickel was added. Since these investigations the use of nickel cast iron was literally grown by leaps and bounds and even in 1929, after several years of phenomenal growth, it increased 100 per cent.

The breadth of the field for nickel cast iron is indicated by such examples of use as automotive cylinders, brake drums, drawing and stamping dies, steel mill rolls, locomotive cylinders and piston rings, machine tool castings, Diesel engine parts and aircraft motor cylinders. One of the largest castings yet made of alloy cast iron was the large bell of a blast furnace.

[Properties bestowed on cast iron by nickel additions are discussed at this point. Effects of chromium are included.]

If the nickel and chromium content is raised and copper is added (nickel-copper-chromium), cast iron will become austenitic, non-magnetic and resistant to corrosion. Such an iron is used generally where a corrosion-resistant cast iron is desired, as for soil pipe and chemical apparatus. It is also used to some extent for castings which must be non-magnetic.

Nickel and Corrosion-Resistant Steels

TO produce a steel that is truly resistant to corrosion, metallurgists have been working for years. Some years ago laboratory experiments indicated that a steel containing about 20 per cent chromium exhibited certain "stainless" properties. These steels were fairly high in carbon, i. e., about 30 per cent, and they were first developed for cutlery and similar purposes.

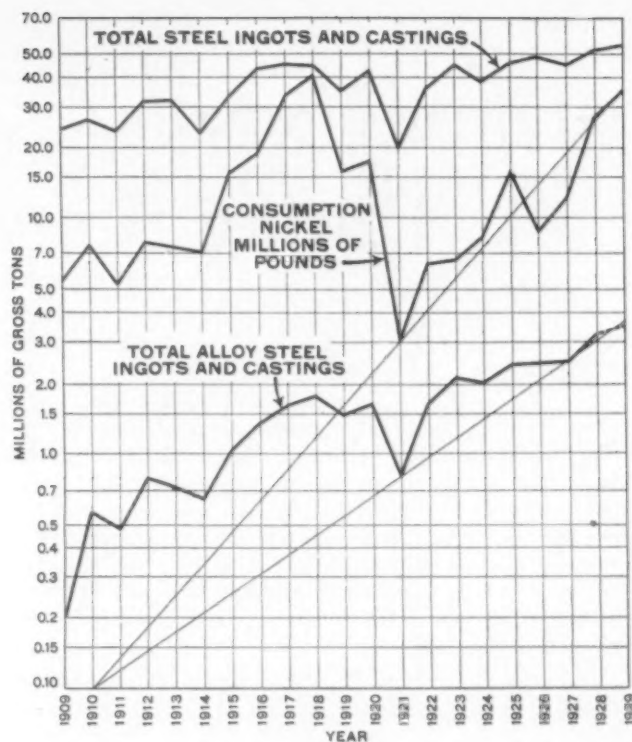
The next step was to reduce the carbon as low as possible, so that the alloy was really a chrome-iron rather than a chrome-steel. This material was soft and ductile and not dependent for corrosion-resistance to the same degree on either heat treatment or finish, though it was still imperfect in this respect. The latest step was to add a substantial proportion of nickel to the alloy and today the preponderant tonnage of ferrous corrosion-resistant materials is of the chrome-nickel-iron type, containing generically about 18 per cent chromium and 8 per cent nickel.

The use of nickel for corrosion-resistant materials expanded 400 per cent in 1929 and the production thus far in 1930 indicates a similar increase this year. Some predict that all engineering structures, such as building skeletons, bridges and ships, will be built of these steels. Whatever the future may be, it is a certainty that chromium, nickel and silicon constitute the triumvirate of alloys that confer corrosion-resistance on iron and steel and that the tendency is toward higher and higher nickel ratios.

Discussion

DR. JOHN A. MATHEWS, vice-president and metallurgist, Crucible Steel Co. of America, New York, commented on those sections of Mr. McKnight's paper that had to do with heat-resisting alloys. He said that, in addition to nickel and chromium, silicon formed the third member of a triumvirate of alloying elements responsible for many useful steels, in which nickel was sometimes of first importance and sometimes chromium. In contradiction to much published opinion, 15 years of experience with corrosion and tarnish-resistant alloys proved that silicon is a useful addition. Silicon-chromium-iron alloys are commonly used, for instance, for valves for gas engines; silicon-nickel-irons are also excellent for certain special services.

Comments on present-day trends in strong structural steels were presented by C. F. W. Rys, assistant to president and metallurgical engineer, Carnegie Steel Co., Pittsburgh. Prior to the war, the structural engineer borrowed the experience of the ordnance expert, and found in the 3½ per cent nickel steel a most reliable material for big bridges. It may easily be made to a yield point of 50,000 lb. per sq. in., and has good ductility in sections as rolled. About 50,000 tons of it has been absorbed by civil engineering structures since 1905. It still remains one of the first steels where maximum ductility and resistance to shock and alternating stresses is required. During the war, however, nickel was scarce and expensive, and a cheaper high-strength material known as silicon structural steel was developed. It has turned out to be a more



Relation Between Nickel Consumption and Output of Alloy Steel in United States

economical material for bridge building, and since 1915 approximately 150,000 tons of it has been so used, 40,000 tons going into the Sidney Harbor arch alone, and another large tonnage into the towers of the Hudson River suspension bridge. For similar reasons of expense, eye-bars of heat-treated medium-carbon steel have largely replaced nickel steel for tension members where weight must be conserved. A still later development is the 1½ per cent manganese steel containing 0.10 to 0.30 silicon, which possesses similar physical properties to the 3½ per cent nickel steel (both in the as-rolled condition) and may be produced at a considerably lower cost. It is being used in the long arch across Kill Van Kull, Staten Island, N. Y.

The extraordinary toughness of 3½ per cent nickel steel was emphasized by John J. Cox, assistant to president, Midvale Co., Nicetown, Philadelphia. In the early days of operation, many serious accidents in the New York subways due to broken axles were narrowly averted. The trouble was entirely overcome by the use of a 3.25 per cent nickel steel with carbon below 0.15 per cent, forged, oil quenched and tempered, which gave the following average test properties: ultimate strength, 72,000 lb. per sq. in.; proportional limit, 51,000 lb. per sq. in.; elongation, 30 per cent; reduction of area, 71 per cent. The Midvale Co. has also made many shafts for gyratory crushers of this material, as well as camshafts for stamp mills. It has worked for months where stronger alloy steels have failed in a day. Large forgings, however, must be made with many precautions if trouble is to be avoided. Mr. Cox, while agreeing that the 3 per cent nickel steel was excellent boiler material for the largest present locomotives, and has great resistance to the development of "age brittleness," believes that it will not be particularly suited to higher superheats, because it is disappointingly weak at more elevated temperatures. Notes on other alloys for high temperature duty were given. He also contested Mr. McKnight's statements about the preeminence of alloy iron rolls, citing the large and growing use of hardened alloy steel rolls in cold rolling and strip mills.

Formation of Zinc and Alloy Layers During Galvanizing Process

BY DR. HEINZ BABLIK*

SOME idea as to how these different layers are produced is given in Fig. 7. In a kettle filled with zinc, half of the surface is covered with flux. When the pickled sheet is introduced into the molten zinc through the flux, the flux first evaporates the water and the remainder of the pickling bath which is still on the surface of the sheet, besides dissolving any iron salts or iron oxides which may still be there. Then the sheet comes into the molten zinc.

As soon as the iron sheet has reached the temperature of the molten zinc the zinc, which at the moment of entrance congeals, becomes again molten in the immediate neighborhood of the iron and diffuses into the iron. Of course, as the temperature is not very high, the diffusion velocity is not very high either, and so the diffusion layer does not become very thick. The next step is that the iron becomes dissolved by the molten zinc in much the same way as sugar is when dipped into water. The main difference is

that the product of this dissolution is not liquid, but, on the contrary, solid.

As we may note from the diagram of the zinc-iron alloys, the crystals formed in this way have a much higher melting point than the temperature of the zinc bath. It may therefore happen that the crystals formed in this manner remain in part fixed to the iron base. Of course a part of these reaction products will sink to the bottom of the kettle, forming an accumulation of the well-known hard dross.

In this way, therefore, the layer C of the zinc coating is formed. This layer has not, of course, always the same composition. The reason is that the quantity of pure zinc remaining in the crystals formed in this way varies. The composition of the crystals corresponds to the formula FeZn_7 . This is shown in Fig. 8, which is a microscopic section through hard dross, showing these crystals. As there is no other explanation as to the way these crystals could get there, the simplest way is to assume that they

*Vienna, Austria.

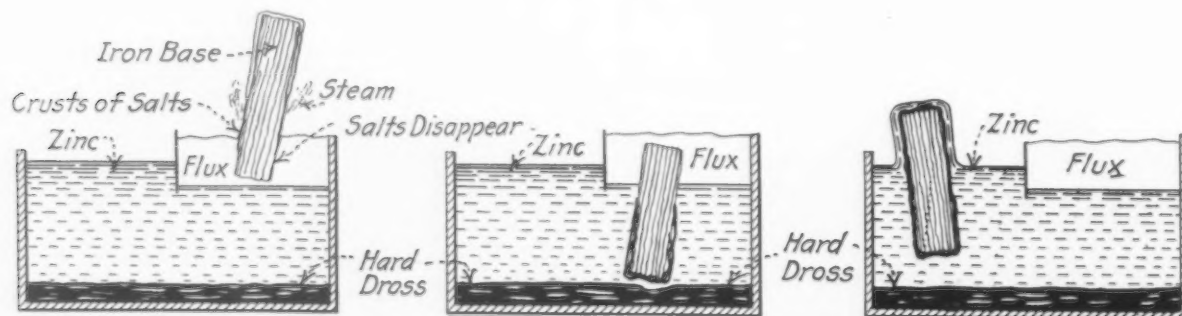


Fig. 7—Showing How the Different Layers Are Produced

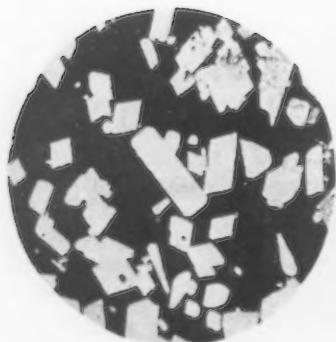


Fig. 8—Cross-Section Through Hard Dross, Showing the Crystals (Much Magnified)

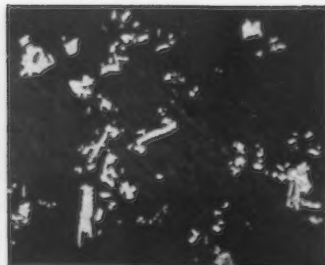


Fig. 9—Crystals of FeZn_7 as Found in the Molten Bath of Zinc

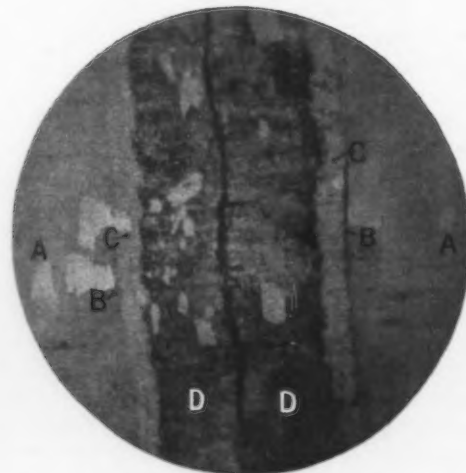


Fig. 10—Crystals Similar to Those of Fig. 9 Are Found in the Outside Layer of the Zinc Coating

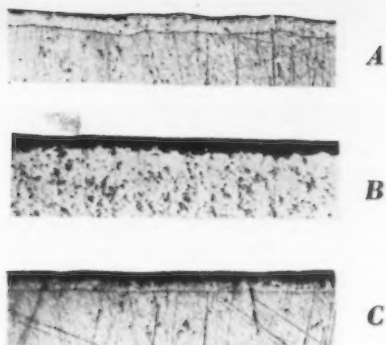


Fig. 11—Varying Thicknesses of Coating. Pure zinc is a minimum in A, a maximum in B and intermediate in C

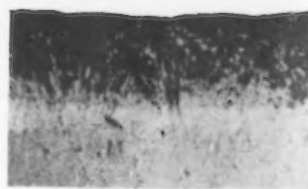


Fig. 12—Layers of Zinc and Alloy Intermingle in Dove-tailed Fashion (above)

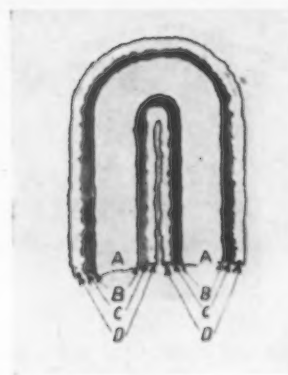


Fig. 13—What Happens to the Several Strata When a Coated Sheet Is Sharply Bent. A is the iron base, B the alloy layer, C the hard zinc layer and D the pure zinc outside layer (at right)

are formed in reaction between the solid iron and the molten zinc.

After the formation of these layers follows that of the outmost layer, named D in Fig. 5. This layer consists of zinc of exactly the same composition as that of the molten zinc bath. When the sheet leaves the bath it is covered with the zinc of the kettle. If this zinc is pure, the outside layer is also pure, and vice versa. If there is, as may happen sometimes, an unusual amount of iron in the zinc bath, we can find the crystals of $FeZn$, which are to be found in the molten bath. A microscopic section of such a bath is shown in Fig. 9. These crystals can be found also in the outside layer of the zinc coating, as shown in Fig. 10, a microscopic section, published by W. H. Walker.*

Thick Coatings vs. Thin Coatings

We will consider the matter of thin or thick coating. Leaving aside the layer B, which can better be regarded as a part of the iron base, there are the two layers C and D, the iron-zinc alloy layer and the pure zinc layer, which come into consideration when dealing with the coating. The three views in Fig. 11 show that the term "thick coating" is not a very apt one.

All three illustrations show more or less thick coatings, but in each case the thickness is of different nature. Fig. 11a shows a coating in which the iron-zinc alloy layer is so remarkably thick, and the pure zinc layer so thin, that there seems to be no pure zinc layer at all. Quite the contrary is shown in 11b. Here we cannot detect any iron-zinc alloy layer at all, but, on the contrary, a very well-developed, thick, pure zinc layer. In 11c we find both iron-zinc alloy and pure zinc layers of considerable thickness.

From the above it appears that it is not sufficient to characterize a coating by its weight on the unit of surface. We must at the same time show a microscopic section of the coating, or name the thickness of the iron-zinc alloy layer, by stating the percentage of iron in the coating.

*Journal of Industrial and Engineering Chemistry, 1912, page 397.

The style of thick coating above described in 11c is the one most frequently found and the cause of it is as follows: When conditions in galvanizing are such as to produce a thick iron-zinc alloy, this alloy layer is generally not even, but looks like a range of rugged mountains. Some crystals protrude like the tops of the mountains, and between them there are deep gullies. Of course, if there is such an uneven foundation for the pure zinc layer, it may need a large quantity of pure zinc to fill up the interstices. The more pure zinc that is filled into the interstices of the foundation the more zinc will be fixed on the latter.

In Fig. 12 these conditions are clearly shown. We see in what way these two layers are dovetailed into each other, and can understand that in general a thick iron-zinc alloy layer will be accompanied by a thicker pure zinc layer also.

If we examine Fig. 13, which is a schematic drawing through a galvanized coating, what follows will not be difficult to understand. In the main only two of the layers are deformed, and the behavior of the whole coating during bending is a function of these two layers. The outer layer consists mainly of absolutely pure zinc, and its thickness is in general no more than 0.1 mm. (0.004 in.).

Imagine a pure zinc sheet of a thickness of 0.1 mm. No one even slightly acquainted with the qualities of zinc would doubt that a pure zinc sheet of this thickness could be bent in the way shown in Fig. 13, without any defect or break occurring in the zinc sheet (film).

Alloys Responsible for Trouble

Looking now at the iron-zinc alloy and remembering that the composition of this layer does not differ much from hard dross, no one the least acquainted with galvanizing could doubt that this layer, by the slightest bending, would break and be destroyed.

The good or bad bending qualities of a sheet can be reduced to a very simple formula: if there is only a very small iron-zinc alloy layer, or, better still, none visible at all, we can be sure of having a coating of good

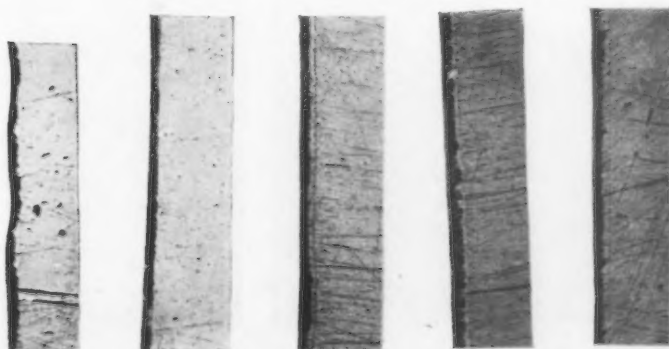
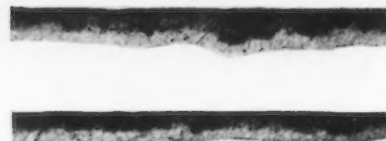
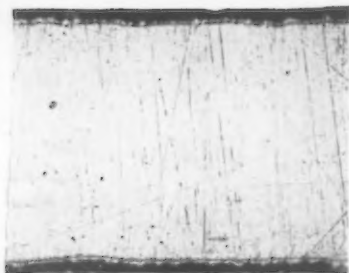


Fig. 14—Differing Thicknesses of Alloy Layers. The figures represent weights in grams for a 39 x 79 in. sheet, the upper figures being for the zinc coating and the lower for the iron-zinc alloy

1,128	1,388	1,144	1,464	1,800
72	178	327	352	617

The two first will not break on bending; the third can be bent over a mandrel of 1.5 mm.; the fourth, 2.5 mm.; the right hand one, 6 mm.



bending qualities. On the contrary, where the iron-zinc ing qualities are to be expected, whether this alloy layer alloy layer exists to any noticeable degree, no good bend-be even or uneven.

A good example of the above is found in Fig. 14, where several coatings are shown in which the iron-zinc alloy layer differs in extent. As the thickness of the alloy layer increases, the bending qualities decrease.

takes place in the iron-zinc alloy layer. As declared above, the iron-zinc alloy layer and pure zinc layer are so firmly fixed to each other that they peel off together. The break of the galvanized coating by bending takes place, therefore, either in the iron-zinc alloy layer itself or between this layer and the diffusion layer *B*.

Avoid the Iron-Zinc Alloy Layer

In obtaining galvanized coatings of good bending qualities the matter is now really quite simple, for it resolves itself into nothing else than the production of coatings containing no iron-zinc alloy layer. That such coatings need not of necessity be so thin as to be unable to protect the iron long enough, against atmospheric attack, we have already learned from Fig. 11.

There does not seem, either, to be much difficulty in finding a way of producing coatings containing no iron-zinc alloy, or a very small one. We need only remember that these iron-zinc alloy crystals forming this layer are the reaction product of the dissolution attack of the molten zinc on the solid iron. To avoid this reaction product there is, of course, no other way than by diminishing the intensity of this dissolution reaction as much as possible.

In the main there are three possible ways of doing this, which, employed all at the same time, will produce galvan-

1530—*The Iron Age*, May 22, 1930

ized sheets of the highest bending qualities. These three ways are:

- 1—Diminish the dipping time.
- 2—Diminish the dipping temperature, and
- 3—So alloy the zinc bath that its dissolution attack on the iron is less severe.

The influence of the dipping time on the growth of the iron-zinc alloy layer is shown in Fig. 17. We note that, with a longer dipping time, the thickness of the alloy layer becomes also greater. Of course, there is no arithmetic progression between dipping time and thickness, be-

cause no inconsiderable part of the reaction product will sink to the bottom of the kettle.

The influence of the dipping temperature is shown in Fig. 18. As any reaction becomes more intensive at higher temperature, that is also the case here. The microphotographic sections are sufficiently instructive for a careful observer.

A most important influence in obtaining good bending qualities will be obtained by alloying the zinc bath. Especially with aluminum are the results extremely satisfactory.

Many Facts About Transverse Fissures Yet to Be Discovered

IN discussing the cause of an accident on the Missouri Pacific Railroad in 1928 wherein 51 persons were hurt, Dr. James E. Howard, engineer-physicist for the Interstate Commerce Commission, summarizes the present status of the transverse fissure problem. He said that while a few such fissures had been observed prior to 1911, they were not recognized as a distinct type of fracture until then, nor were they taken as a serious menace to safety. As time passed they appeared in numbers, and now are discovered at the rate of 4000 or more each year. They are tension failures, developing gradually from a nucleus, and the fractured surfaces have a burnished oval spot where the opposite faces are forced together when the rail is put in compression above its neutral axis by a wheel directly above.

One of the first requirements of a rail is its strength as a beam. This is most easily met. If the rail is too light for the load it bends slightly, but such overstrain cannot fail to be noticed. Gaggling during straightening has also been blamed for transverse fissures, but Dr. Howard believes that detrimental effects from this source have not been witnessed in fractures of rails in the tracks.

It is known that shrinkage cracks are formed within both the head and the base of many rails due to differences in temperature, surface to center, during manufacture. Even though cracks are not formed, the metal in the center of heavy sections is under considerable tension, balanced by compressive strains in the surface layers which first cooled to relative rigidity.

Such internal tension stresses in the heads are further augmented by the impinging pressures of the passing wheels. Cold work immediately below the running surface of the rail sets up compressive stresses in the outermost layers, with reactions of tension stresses in the interior of the head. Such strains are both lengthwise and crosswise, and tend to cause transverse fissures and split heads, respectively. These strains due to cold rolling of the wheels are far greater than those due to resistance of the load as a beam. "In other words, the greatest strains which rails are required to endure in service come from the impinging pressures between the tread of the wheel and the running surface of the head. Such pressures carried to extremity would destroy any known grade of steel, and the display of thousands of transverse fissures is taken as evidence that a safe margin does not exist in the metal now being used."

It is now suspected that transverse fissures may grow from minute centers to dangerous proportions in very short time. Rails in which fissures have been indicated by the Sperry electrical detector have been taken from the track and the fissure brought to the surface by a peening hammer striking a few dozen blows on the tread at the suspected location, or by a light sledge hammer striking the end of the rail.

So much danger is inherent in this situation that Dr. Howard strongly recommends a comprehensive research to find the metal which can best endure the high wheel loads. With the Sperry detector it is possible to discover incipient internal fissures, and the problem of relating them to metallurgical structure has thus been enormously simplified. The following questions remain to be answered:

- Will the suppression of shrinkage cracks in the head lengthen or shorten the life of a rail?
- Why should a certain heat of steel develop far more transverse fractures than succeeding heats?
- Can seaminess (acicular longitudinal slag streaks or extended blow holes), the accepted cause of compound transverse fissures, be eliminated?
- Is there any inclusion or specific metallographical structure at the nucleus of a transverse fissure?
- Are cooling strains on the verge of rupture converted into open cracks by wheel loads?
- What characteristics predominate in rails of greatest endurance?

Corrosion of Nitrided Steels

IN a report presented to the Paris Académie des Sciences in December, 1929, Léon Guillet and Marcel Ballard discussed the corrosion resistance of steels case hardened by ordinary methods and by nitriding (heating to 500 deg. C. in ammonia gas). Experiments were carried out with six steels of the following compositions:

Steel No.	C	Si	Mn	Ni	Cr	Mo	Al
1	0.27	0.37	0.59	...	1.65	0.26	1.02
2	0.24	0.53	0.60	1.62	1.98	0.34	1.30
3	0.07	0.10	0.18	...	...	...	...
4	0.06	0.13	0.33	2.08	0.10	...	...
5	0.09	0.15	0.30	3.17	0.55	...	...
6	0.09	0.13	0.42	4.08	0.91	0.32	...

Samples of each were subjected to corrosion by 5-per cent sulphuric acid, 5-per cent hydrochloric acid, sea water with 5-per cent oxygenized water, ordinary river water, water from atmospheric fog with 28-per cent salt, a 7-per cent solution of sodium hydrate and 7-per cent solution of copper sulphate.

It was found that the nitrided steels are distinctly more soluble in dilute sulphuric and hydrochloric acids, with the exception of No. 6, which resisted sulphuric acid much better after nitriding. In the oxygenized sea water and the fog water the nitrided steels corroded less than those case hardened with carbon, especially in the chromium-aluminum steels. Nitrided steels are also much less corroded in river water, and the chromium-aluminum and nickel steels are also but slightly attacked.

The most remarkable results were shown when immersed in copper sulphate solution:

Steel No.	Loss of Weight in Gm; 43 Hr.	
	Case Hardened	Nitrided
1	9.288	0.244
2	8.376	0.340
3	9.848	0.056
4	10.601	0.081
5	11.207	0.525
6	11.130	1.516

Malleable Foundry Iron Practice

Continuous Duplex Melting and Use of Powdered Fuel—Factors Affecting Machinability Much Debated

THREE papers on the operation of malleable foundries and some considerations of their products were read at a session on malleable foundry work, before the American Foundrymen's Association in Cleveland May 13. B. R. Mayne, general manager, Saginaw Malleable Iron Division, General Motors Corporation, had a paper on "Continuous Melting Process as Applied to Malleable Iron," H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, read one on "Factors Affecting Machinability of Malleable Cast Iron," and E. F. Wilson, Jefferson Union Co., Lockport, N. Y., had a paper on "Some Features of the Pulverized Coal-Fired Air Furnace," which, in his absence, was read by an associate. Brief abstracts of these papers follow.

Continuous Process Applied to Malleable Practice

NEEED for a continuous pouring system in the Saginaw malleable foundry led to an investigation of melting methods to give a continuous supply of metal for pouring. The system finally adapted provided for the use of cupolas for melting the cold stock, and refining and raising the temperature in electric furnaces.

Cupolas are supplied with fore-hearths in which a soda-ash flux is used to reduce the sulphur content of the metal. The electric furnaces are lined with silica. Metal stock used consists of pig iron, alloy-free flashings, pressed steel bundles and rails, hard iron remelt and soft iron scrap.

Hand cupola charging at present is considered most economical. Cupola blast pressure is somewhat lower than in ordinary gray iron practice, due to open nature of the charges. Iron at the cupola spout averages 2800 deg. Fahr., and from the electric furnaces, 2950 deg. Fahr. Three tons of hot metal are taken at one time from the 10 to 12-ton supply in the furnace. The make-up iron from the cupola is then ready to be poured in 4 min.

Close laboratory control of both the cupola iron and that in the electric furnace is necessary. From the standpoint of uniformity of cupola operation, quality of coke is most important, and the routine test used is that for combustibility.

There are 112 molding stations, each located alongside

one of the molding conveyors, thus enabling the molder to place his completed molds on the conveyor by taking only a few steps. The molds travel on the conveyor to a pouring zone, where the pourers stand on a moving platform and pour them off continuously by means of ladles carried by electric hoists operating on an overhead monorail loop. The pourers' platform moves at the same travel speed as the molds.

Iron from the cupola has from 2.60 to 2.80 per cent carbon, an effort being made to keep to the low side.

Factors Affecting Machinability of Malleable Cast Iron

CONSIDERABLE difference of opinion exists on whether or not high-carbon malleable cast iron is more easily machinable than low-carbon metal. The common points of view of both schools of thought are examined and compared, and the author presents the available evidence for the case of users and producers.

In his experimental work to obtain authoritative information, the author excluded tests on abnormal iron, confining his investigation to metal of an analysis at least comparable with the usual commercial irons.

In deciding upon experimental methods of determining machinability, it was realized that there is a great difference of opinion as to what constitutes machinability, and that tests to give the same information as obtained under actual operating conditions would be impractical to carry out. The test procedure decided upon was one which measured tool stress at given feeds and cutting speeds.

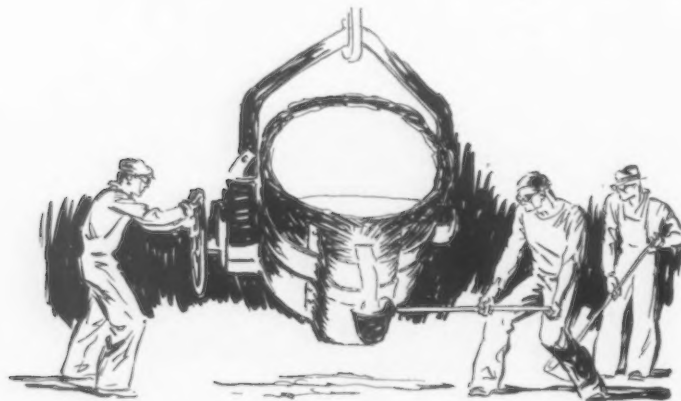
Tests were made under which there were measured (1) the torque and thrust of a drill advancing at constant speed and (2) the feed and torque of a drill advancing under constant pressure. Corroboratory experiments for other machining methods, turning and threading were carried out on a limited scale.

The problem for solution was stated to be the determination of whether there is a relation between machinability and tensile strength in malleable iron. Specimens were obtained from 14 malleable plants; data of tests are given and discussed.

The author concludes, from the data obtained, that the machinability of malleable iron, as measured by drill testing, is very largely determined—as are its other physical properties—by carbon content, and that the threading tests are of general interest only and cannot be given too much weight.

Indications from the turning tests showed that in the outer 1/32-in. of the castings the results are so erratic as to permit no general conclusions as yet. Observations are recorded showing even well marked exceptions to the expected relation that outer skin is more difficult to machine than the heart.

This paper deals with the practical and theoretical factors of the construction and operation of the air furnace for producing malleable castings. The main headings of discussion are:



(1) Design, (2) Materials of Construction, (3) Methods of Furnace Construction, (4) Calculation of Mixtures, (5) Features Affecting Oxidation, (6) Furnace Operation, (7) Test Methods to Determine Heat Progress, (8) Doping the Melt, (9) Pouring the Melt, (10) Features of Combustion, (11) Powdered Coal Combustion, (12) Fuels, (13) Bath Reactions and (14) Modification of Air Furnaces.

Each of these features is discussed in considerable detail, the author giving the practice of his organization. It is stated that the air furnace has a much larger field in the melting of iron than at present is utilized.

In relation to design, the reasons for the various details are given, covering the length, width, side walls, combustion chamber, hearth bottom, roof, bridge walls and tapping spouts. The standard refractory shapes are listed and the effect of severity of service brought out. Tests of refractories also are given.

Under calculation of the mixtures, the reasons for using the various materials are given. Slags and atmospheres are discussed as factors affecting oxidation. Theories of combustion and heat transfer in the melting process are reviewed.

Under determination of heat progress, methods for testing the temperatures and fluidity are compared, the methods discussed being the cup test, fluidity test, steel rod test, use of optical pyrometer and the test for degree of graphitization. Mechanical features of pouring the melt are listed, while the metallurgical considerations of combustion for the various fuels are compared and bath reactions discussed.

Lively Discussion on Machinability

MUCH discussion, mostly written, followed the reading of the paper on machinability of malleable cast iron. It was pointed out by several speakers that the curves shown in the paper might easily have taken a different form, if certain of the outlying plotted points were disregarded. The discussion centered largely around the different characteristics of hard iron and soft iron, and a good deal was said about the great effect of the surface or skin upon the rate of cutting with a drill or other tool.

C. M. Jasper, director of research, A. O. Smith Corporation, Milwaukee, reported upon tests of specimens, which bore out the findings of the paper. He found that castings of lower carbon content, and consequent higher strength, give more uniform and less difficult machining. They are more uniform in strength and have fewer low values. He questioned, however, the advisability of using the higher strength castings, because of the much greater shrinkage troubles to which they are subject.

Phosphorus and Silicon Have Effect

Prof. Enrique Touceda, consulting engineer of the Malleable Iron Research Institute, Albany, N. Y., pointed out that the phosphorus and silicon elements are of great importance in connection with machinability, and should be taken into account. He believes that it makes no difference whether the carbon be high or low, and said that certain of the diagrams should have been plotted against carbon content of the casting, instead of against the tensile strength.

Another speaker pointed out that the cutting speeds of machines used today are much higher than formerly, and that there has been a steady improvement brought about in machinability of castings, from many sources. Carbon content does affect the machining qualities, particularly in the interior of the products, and the surface condition has a large effect, especially on thin products. The effect of the interior analysis is much diluted by the skin effect. Therefore, a small variation in machinability may be far

Authors of Malleable Section Papers



B. R. Mayne



E. F. Wilson

outweighed by other factors, when we consider the economic viewpoint.

Another speaker expressed the belief that annealing is of vastly more importance in connection with machining castings than is the original composition of the metal itself. He defined the high-carbon and low-carbon irons as being respectively 2.50 to 2.90 per cent and 2 to 2.40 per cent carbon. The former has a tensile strength around 45,000 lb., with 10 per cent elongation, and the latter a strength of 55,000 lb. and 20 per cent elongation.

Prof. O. W. Boston, University of Michigan, Ann Arbor, stated that the material is only one of several variables affecting machinability. Both surface and interior conditions are to be met, and annealing invariably precedes machining. If the piece is to be faced, then we are concerned with the surface mainly—that is, the skin. Boring, drilling, tapping, etc., are affected by the interior.

W. R. Bean, Grindle Fuel Equipment Co., Whiting Corporation, Harvey, Ill., expressed the belief that difficulties in machining are mainly from the annealing practice rather than from the materials of which the castings are made. He questions the great utility of machinability studies in cases where machining costs represent not over 10 per cent of the total cost of the finished piece. In one case he cited, machining costs were 2c. and total cost 40c.

Malleable Iron Round Table

ABOUT 100 men gathered at a round-table luncheon in the Hotel Hollenden, Cleveland, May 13, to discuss intimate problems connected with the making of malleable iron castings. The discussion was led by P. C. DeBruyne, Moline Malleable Iron Co., St. Charles, Ill. As usual in such a meeting, questions and answers came from all over the floor.

Growth of castings during the annealing process was taken up, one speaker stating that annealed chain parts were found to have enough growth, when annealed without packing, so that a 10-ft. length of chain was $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. too long. The chain would not fit the sprocket designed for it. By packing the castings before annealing, this trouble was overcome. The opinion was expressed that castings of higher carbons grow more rapidly than those of lower carbon content.

Oxidation of Castings

Prevention of oxidation during annealing has been the subject of much talk. One speaker told about an effort to use muffle ovens for this purpose, wood or coal being

burned in the oven to absorb the oxygen from the air. This did not give much benefit, though the muffle oven does not decarburize so deeply as pot ovens.

Finally, however, he obtained a good result by making the muffle so tight that absorption of air was practically impossible, and then the muffle was packed as densely as possible with the product. Even then, however, as the muffle cools, there is some oxidation because of suction or infiltration of air.

Difficult to Use Powdered Fuel

Pulverized coal when used for annealing ovens was reported to be something of a problem, because of the widely varying quantities burned hourly during the heating up and the holding periods respectively. Two separate burners may be required for these two functions. One speaker reported using 500 lb. of coal an hour in getting the furnace up to temperature, and only 30 lb. an hour while holding that temperature.

Pulverized coal equipment, as usually installed, will not readily take care of such a wide variation of consumption. To offset this condition he made it a practice to use an excess amount of air to get the front of the oven hot. This, however, caused the product to suffer and lessened the life of the annealing pots.

He then adopted the expedient of burning coal intermittently during the holding period. It would be on for several hours and then off for a longer period, resulting altogether in about 27 hr. of burning during 71 hr. (total) of holding. This method of controlling the atmosphere

was found to be successful. To avoid oxidation he has adopted the practice of firing with a smoky flame.

Making Pots of Alloyed Metal

Adding chromium to the material out of which the pots are made was reported by one man to give a better life to the pots, and less oxidation to the product. He stated that he was getting 22 or 23 heats from these pots, in place of the previous average of 16. On this subject another man reported getting 132 heats from a special alloy pot, but found that this was not enough to overcome the expense of making the pots. The pots did not wear out, but had to be discarded because they warped so badly.

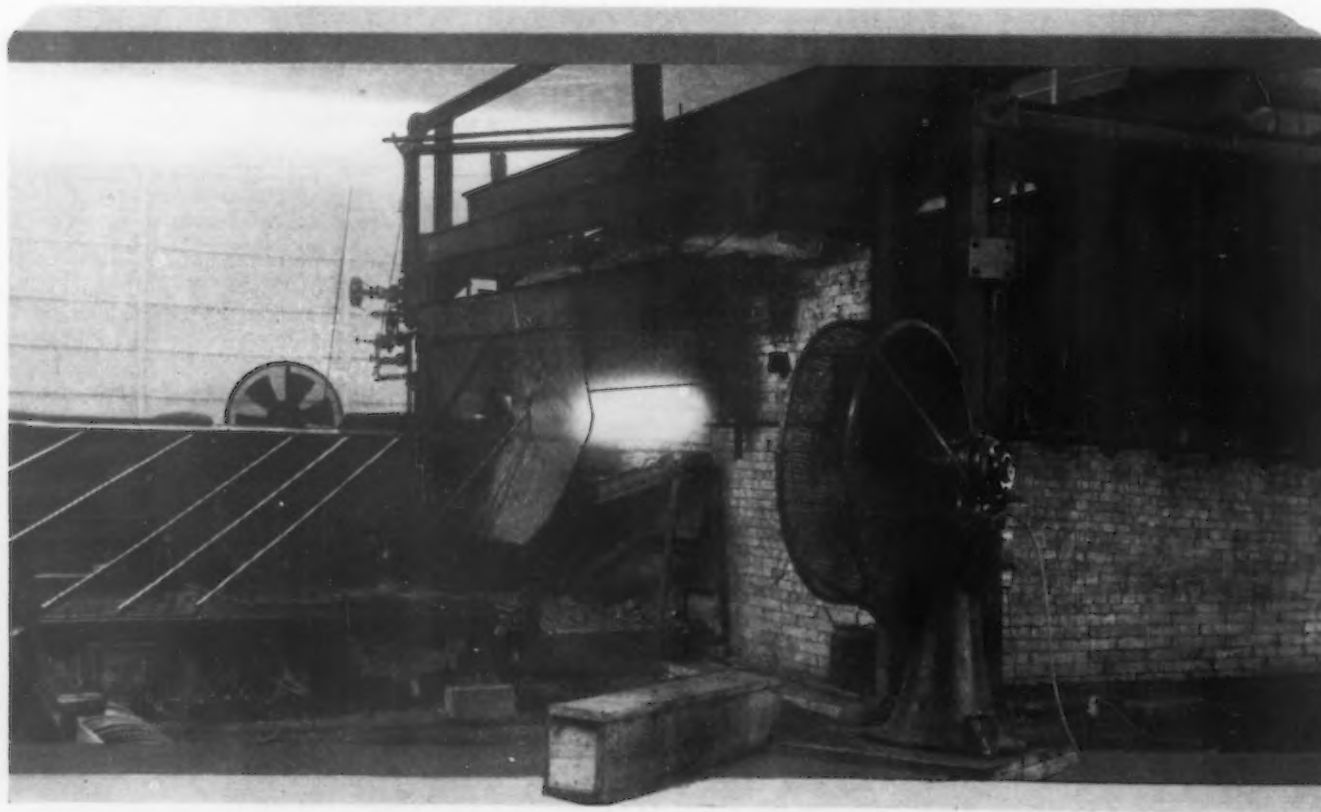
Another speaker reported 45 heats as the average life of cast iron pots. He has been experimenting with electric steel pots of 0.20 to 0.30 per cent carbon, and about half as heavy a wall as the cast iron pots. Some 30 heats have been run on these pots, with no sign yet of growth or appreciable oxidation. He believes that small amounts of alloys in the pots will have no effect either way on oxidation, but that they may provide lack of warpage and growth in steel pots.

Reporting upon an electric furnace used for annealing purposes, one man told of his experience with furnaces having a capacity of 25 tons each. This reduced the annealing time so that he is now operating on a cycle of three days, then dumping the pots on the morning of the fourth day. Customers have learned of this operation and are demanding shorter delivery times, asking for their castings in seven days from date of order.

Natural Gas-Fired Skelp-Heating Furnace

DESCRPTION of the new tube mill of the Laclede Steel Co. at Alton, Ill., was made at page 1226 of our issue for April 24. The present picture of the heating furnace is of interest for several reasons. It shows at the left the draw carriage at the exit end of

the furnace, with hinged telescoping guides feeding from the carriage to the feed of the sizing rolls. Man-cooling fans, one on each side of the carriage, are provided. Magnetic rollers mounted on the charging carriage deliver skelp at the other end of the furnace.



Standard Cost System for Cast Iron Recommended



A. E. HAGEBOECK,
Chairman of the Cost
Session and a Pioneer
in this Work

AN attendance of over 225 at the session on foundry costs, held during the annual convention of the American Foundrymen's Association at Cleveland, May 12 to 16, is convincing evidence of the keen interest in this vital subject.

Ablely presided over by A. E. Hageboeck, Frank Foundries Corporation, Moline, Ill., statements were made as to the success following the adoption of recently formulated-cost systems for steel founding and for malleable practice by various plants in those fields. It was emphasized that the results have amply justified the trouble and labor involved in perfecting these methods of cost accounting.

Two main topics formed the backbone of the session last week—a new cost system for gray iron foundries and consideration of plans for a cost system for non-ferrous foundries.

Gray Iron Cost System Perfected

IT was announced that a system for cost accounting in gray iron foundries had been perfected, largely by the zeal and efforts of J. L. Carter, Sacks-Barlow Foundries, Inc., Newark, N. J. This system, details of which have been published recently, has been adopted by the Gray Iron Institute and recommended for adoption as standard by gray iron foundries of the United States and Canada.

A general and quite full presentation of the system was offered by Mr. Carter, followed by general discussion and questions from the floor. Mr. Carter dwelt first on the necessity for and desirability of such a system. Too long have gray iron foundrymen been making castings without knowing their real costs—often resulting in unprofitable operations on certain patterns and many times upsetting the profits of foundries better able to pro-

duce other types of products. Much confusion has followed haphazard practice and there has long been a demand for some reliable cost accounting plan. It is Mr. Carter's and the institute's belief that such a plan has been perfected—not foolproof in every case and not free from objections, but on the whole satisfactory for the use of most foundries.

Some of the advantages of the new system were dwelt on by Mr. Carter. Among those enumerated are: Establishment of proper selling prices; elimination of guessing on quotations; realization of profit and of improved products. There are many ways to figure costs and many are in use, but a standard method is desirable. There is usually one best way and the one formulated is regarded as the best one, subject, however, to being kept up to date constantly, with the A. F. A. committees acting as a clearing house. Other recognizable benefits of a standard system are a stabilized market, prices based on real knowledge of cost and all figured by the same method.

Some of the main features of the new system were explained by Mr. Carter. Among these are that it meets the needs of small foundries and that it is believed to be the simplest possible. The need of the system is demonstrated by the fact that 85 per cent of American gray iron foundries have no cost system, said the speaker.

In general, the method may be represented briefly, said Mr. Carter, by a table which he drew on the blackboard and which is reproduced here. General overhead (O. H. D.) is divided into three subdivisions, as indicated: Fixed charges; heat, light and power; and general expense. This is allocated as indicated. One of the most difficult problems was to determine the cost of cleaning and shipping, said Mr. Carter.

Proposes a System for Non-Ferrous Plants

AFTER the presentation of the gray iron cost system, the subject of a plan for "Organizing a Non-Ferrous Foundry Cost Group" was discussed by C. S. Humphrey, Westco Chippewa Pump Co., Davenport, Iowa. The author recounted some of the steps taken to interest foundries in this matter and outlined the program to date in a written paper, not preprinted. He predicted that cooperation would be achieved and that ere long a recommended cost accounting system would result.

Allocation of Cost and Sample Record Based on the New Cost System for Gray Iron

Division No.			Cents
21.	Mold direct labor	Cost of metal	1.5
22.	Mold indirect labor	Molding direct	1.0
		Molding O.H.D.* at 100%	1.0
23-2.	Sand	Core, direct	0.5
23-3.	Supplies and tools	Core, O.H.D.* at 100%	0.5
27.	Repairs	Cleaning and shipping	1.0
28.	Foremen and clerks	Total	5.5
29.	Share of general overhead	Loss at 10%	0.5
29-1.	Fixed charges	Cost, f.o.b. fdy.	6.0
29-2.	Heat, light, power	Delivery cost	0.2
29-3.	General expense	Total cost	6.2

*Overhead



Chemistry of Steel is Unduly Emphasized

Important Specifications Relate to Physical Properties or Mechanical Characteristics of Steel, Not Gaged Accurately by Chemical Composition

BY JOHN JOHNSTON

A SPECIFICATION is merely a codification of experience (modified at times in a spirit of compromise) designed to secure to the user material suited to his needs; often it is concerned less with qualities dominant in the ultimate use of the steel than with such properties as affect the ease of carrying out the successive manufacturing operations which yield the final product. The basic requirements set by manufacturing processes as well as by ultimate service are in most cases for physical properties; and it would seem as if chemical limitations should be added only in so far as it is known that the required group of physical properties is thereby most readily secured.

Rigid chemical specifications are completely justifiable and necessary in purchasing any substance to be used as a chemical reagent or in any connection in which its chemical properties play a direct rôle, as in ores or foodstuffs. For instance, sulphuric acid must for many purposes be free from arsenic—an amount of which measured in parts per million renders it unfit for use in pickling steel.

Such *rigid* analytical specifications are distinctly less justifiable in the purchase of materials of construction which are used because of their physical or mechanical properties. In this case the purchaser is really interested in the structure of the material supplied; and need not care what elements are present provided that the material fulfils his requirements as to mechanical qualities such as strength or ductility. This leads one to wonder whether chemical specifications have not attained their present vogue because it has proved to be more difficult to set up entirely adequate physical or mechanical tests.

The accompanying article is an abstract of a paper read before the American Iron and Steel Institute at New York, May 9.

That chemical analysis of a steel, as ordinarily carried out should not always correlate satisfactorily with the quality of the finished steel product may be due to the fact that the chemical analysis has not gone far enough to be completely effective. For while we are determining the percentage of A B C and D (for instance, carbon, sulphur, phosphorus, manganese) we may be omitting E and F (for instance, nitrogen, oxygen, hydrogen, non-metallic inclusions) because E and F are thought to be present in such small proportion as to be without influence, perhaps too because the method of determination is slow, troublesome or unsatisfactory. But a very small proportion of E or F in the liquid steel *may* exert an influence comparable to the use of an iron catalyst in the synthesis of ammonia, a little glue in a plating bath, or to the "salting" of crystallizing solutions.

There is no reason *in principle* why this same effect should not appear in the crystallization by freezing of molten metal, causing differences in the resulting aggregate or conglomerate making up the solid piece of metal, or in the changes taking place at the so-called "critical" temperature range of steel. In fact the whole of the important phenomena taking place at this range are essentially changes in the physical architecture of the metal, and are not accompanied by any change in "chemistry."

Another possibility to be considered is the difference which may result from a different distribution of a fixed proportion of a component, as determined by analysis. For example, an amount of about 0.90 per cent carbon may be present in iron in at least four modes of distribution, as sketched in the figure. It is well known that the machining properties of such a material vary greatly with

BORN in Scotland in 1881, John Johnston was educated at Perth Academy and at University College, Dundee, whence he was graduated in 1903 with the degree of B.S. In 1903 he was awarded a Carnegie scholarship in chemistry and did research work from 1903 to 1905 with Prof. James Walker in Dundee. From 1907 to 1908 he was research associate in the laboratory of physical chemistry at the Massachusetts Institute of Technology. In 1908 he was graduated as Doctor of Science from St. Andrew's University of Scotland. His honorary degrees are: M.A., Yale University, 1919; D.Sc., New York University, 1928, and Lehigh University, 1929. From 1908 to 1927 he occupied the following positions: On the staff of the geophysical laboratory of the Carnegie Institution of Washington; in charge of research of the American Zinc, Lead & Smelting Co., St. Louis; connected with the war gas investigations under the United States Government; secretary of the National Research Council, Washington, and chairman of the chemistry division; Sterling professor of chemistry, Yale University, and chairman of the department of chemistry. Since 1927 he has been director of research, United States Steel Corporation, Kearny, N. J. He is an author, alone or in collaboration, of some 60 papers published in various scientific periodicals.



John Johnston

the mode of distribution of the carbon, even though the chemical composition is identical.

Another example is the mode of distribution of non-metallic inclusions, which are generally recognized as being more undesirable in relatively large masses than when the same total proportion is scattered through the metal.

Chemical Specifications too Precise

SINCE the quality of the final metal depends not only upon its "chemistry" but also upon what is done to it after it leaves the furnace, and that the chemical analysis is admittedly incomplete—it seems as if *too precise* chemical specifications are, in the present state of knowledge, not always justified. As a specific instance, the upper limit of allowable sulphur is often set at 0.04 per cent; yet a committee of the American Society for Testing Materials, after careful investigation, concluded that sulphur may go as high as 0.077 per cent in plates (the highest percentage examined), and 0.06 per cent in rivets without showing any systematic relation between any of the properties determined and the percentage of sulphur within the limits stated.

It may be that sulphur is, in a sense, a symptom rather than a cause, that the steel is better merely because it was worked long enough in the furnace to bring the sulphur within the prescribed limits; on the other hand, some seem to be of opinion that the methods necessary to bring these elements below a low limiting percentage *may* yield a steel less well adapted to its purpose than it would have been if finished at a somewhat higher level. However this may prove to be, the precise limits specified appear to be the result of trade practices rather than of a conclusion based on really comparable experiments designed specifically to answer unambiguously the question at issue.

A similar question, on which also further work is needed, is the old controversy as to the comparative merits of Bessemer and open-hearth steel. No one seems to be willing to state that he will distinguish with certainty between steels of the same "chemistry" made by the two processes.

That chemical analysis alone, though of course quite indispensable, does not tell the whole story and that its results may, therefore, be misleading as to the quality of a given piece of steel, is shown by the well-known fact that a piece of steel may be ruined by improper fashioning or heat treatment which, however, in no wise affects its chemical

DR. JOHNSTON'S view is that more consideration should be given to specifications for physical and mechanical properties of steels, when writing specifications, and less to chemical analysis. He believes that much fundamental research is necessary to discover the essential criteria of quality, and that when these are found it will also be found that we are making a bigger variety of alloy steels than are necessary.

more narrowly implies wasted effort which ultimately must be paid for by the consumer.

Discussion

"No specification is sacred," said Dr. H. W. Gillett, director, Battelle Memorial Institute, Columbus, Ohio. "All specifications are human documents based on varying proportions of knowledge and of mere opinion. Almost all the difficulties cited by Dr. Johnston are due to the high proportion of opinion and the low proportion of knowledge.

"As knowledge advances regarding the properties that ought to be measured, of cheap and rapid methods of measuring them, and of the choice of composition, treatment and manufacturing processes that will produce those properties, the specifications should change correspondingly.

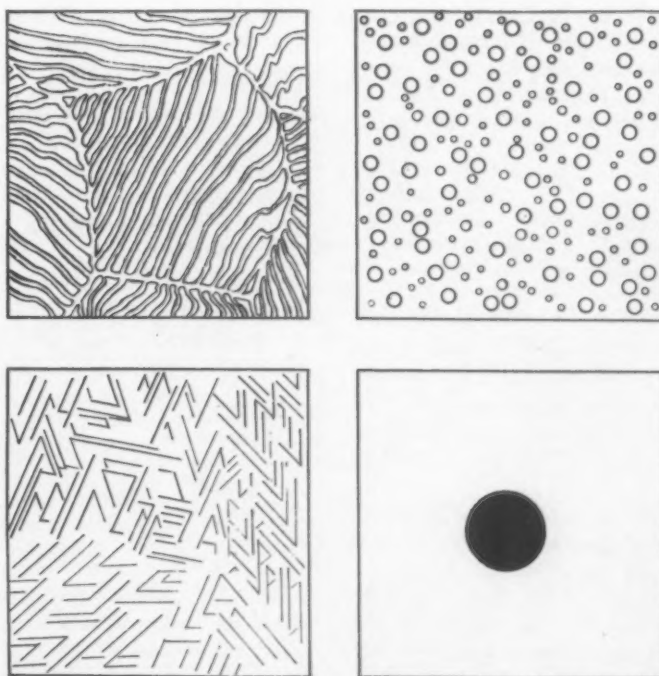
"A specification that remains unchanged for years is generally a sign of a lack of research on that commodity, or of failure to assimilate the results of research. Producers of commodities whose specifications never change, may find a 'Model T' on their hands.

"The imposition of both physical and chemical requirements, to which Dr. Johnston objects, is being abandoned in principle by most specification-making bodies, at least when a finished product is in question. There are cases

where both have to be specified. A firm making heat-treated parts for automobiles, for example, has in mind both the finished product and a definite heat-treatment procedure. By varying the heat treatment to correspond, it could utilize a dozen different steels, and in each case wind up with the desired properties. But it chooses one chemical composition from the points of view of the properties of the final product, the ease of application of one definite heat treatment and the ease of machining.

"Such cases do not occur frequently.

"Many admittedly unsatisfactory specifications are unsatisfactory because there exists no certain, cheap and rapid method of determining (Concluded on page 1578)



CONVENTIONAL Representation of Four Possible Modes of Occurrence of 1 per cent Carbon. In steel as carbide in lamellar pearlite; spheroidized pearlite; as solid solution, high-carbon martensite; and as temper carbon (graphite) in iron



Budgetary Control Proves Profitable in Iowa Steel Foundry

BY A. K. READING*

THE very first presupposition of a successful budget is that there is, or should be, a profit on the cost of doing business; so the assumed selling price must be greater than the cost of operations.

When work was started on our budget in November, 1927, it was felt that 2500 tons would be sold in 1928 at a price of \$145 per ton and could be produced at \$135 per ton. In line with the spirit of budgeting, the year's tonnage was set at 3000, with a sales price of \$150. The cost of doing business was depressed to \$130 per ton, leaving a spread of \$20 per ton for profit.

The predetermined cost price was broken down so that the superintendent had to do his work for \$83.20 per ton or 64 per cent of the cost, while the general expense was to be held to \$46.80 or 36 per cent of the cost. These costs and their percentages were again broken up, somewhat arbitrarily, into dollars per ton and per cent of total cost for every item listed on the Steel Founders' Society Standard Cost Summary.

Departmental Budgetary Percentages Fixed

Our program called for 250 tons a month for both production and selling. Therefore, it became a simple matter to allot to each item of cost or expense just the amount that should be spent in a month to carry on the program. Figures were prepared for January, then for January and February, then for January, February and March, and so on until the 12 consecutive months were covered and our budget was complete and ready to function. It was proposed at the end of every month to insert behind the divisions of the budget, the actual cost of each particular item from the beginning of January, as well as the actual percentage of total cost per ton for that item. Some of the departmental budget percentages that were experimentally set down follow:

Metals	11.84
Conversion	17.87
Direct labor	9.36
Molding indirect expense.....	11.3
Core department indirect expense.....	2.90
Cleaning indirect expense.....	7.93
Annealing indirect expense.....	2.71

The first three months of 1928 passed by; then things began to happen. It became apparent that our hopes of securing \$150 a ton for sales could not be realized. The drying up of a local source of scrap shot the metals percentage up to 17 per cent of the cost instead of 11.84 as budgeted.

We had expected to get a \$20 spread between sales and cost, but after three months we were not getting the \$20 and it didn't look as though we would at the end of the year. The budget, however, showed just where the fault lay and those cost items which were contributing to the delinquency. The remedy, of course, was to keep our \$20 spread no matter what the sales price might be or what we had to pay for scrap.

*General manager, Zimmerman Steel Co., Bettendorf, Iowa. Abstract of paper read before Steel Foundry Society of America at Cleveland, May 14.

We had thought our \$130 a ton cost of doing business was very good practice, but now, under stress of necessity, everyone in the organization commenced to dig into all conceivable angles of the budget so that our total cost might be lowered. New equipment was added and better methods of manufacturing put in effect, methods about which we had always talked but never installed.

The results were far-reaching. We ended the year with tonnage sold greater than the budget. Our costs were diminished and a spread between our selling price and cost of doing business was obtained, not of \$20 as budgeted, but of a much larger amount. The cost per ton of \$130 was greatly lowered; yet the items totaling 64 per cent in the budget, for which the superintendent was responsible, came out 64½ per cent, indicating a uniform effort reduced cost in each item of shop expenditure.

A budget, if constructed as a cooperative friend and not as an inexorable tyrant, can make of itself a guiding influence, correcting many ills. It can point out to a department where savings can be made in a helpful and encouraging manner. During the first two months of 1929 our cleaning department expense was running 11.4 per cent of the total cost. It had been budgeted at 9.9 per cent. The foreman was called in and his expenditure laid before him. He was shown that his department percentage was running higher than the budget because his supply account and his indirect labor percentages were swinging out of line. For the first time in his life, probably, that foreman got a thorough picture in detail of just what his department was all about, not only in the offending items, but in all others.

Percentages of Total Cost at End of Year

When all the figures are compiled at the end of the year, many interesting statistics appear. Many phases of shop operation show up in a much more important manner than they do if budgeting is not attempted; while others, which generally have been thought of as highly influential on costs, scarcely warrant the excessive attention that has been paid to them.

To illustrate, some of the percentages of total cost are herewith given:

Metals	16.75
Conversion	16.65
Direct labor	12.08
Molding indirect expense.....	10.50
Core indirect expense.....	2.28
Cleaning indirect expense.....	10.66
Annealing indirect expense.....	2.45
Sand indirect expense.....	1.70
Core mixtures	0.90

We hear much about sand reclamation, core oils, mixtures, etc. One wonders what would happen if the same relative discussion took place about metals, or conversion, or direct labor, with their high percentage of cost to total cost. Sand with its 1.7 per cent and core mixture with its 0.90 per cent are important and have their place in the foundry, but they are not of the paramount importance often conceded them.

New Records by Foundrymen During Foundry Week at Cleveland



IN spite of business depression, new records in attendance, in number of exhibitors, in floor space taken and in interest in technical subjects were made at the thirty-fourth annual convention and twenty-third exhibition of the American Foundrymen's Association, held in Cleveland, May 12 to 16. All sessions and the exhibits were in the spacious Public Auditorium, eminently suited for such an affair.

General news of the full week's happenings are given in the following paragraphs. Details of the technical sessions in the various fields will be found in the feature section of *THE IRON AGE* in this and later issues.

Technical Sessions of High Quality

ALL the many departments of the American foundry industry were represented in the program of 14 separate regular technical sessions, at which 37 papers by authoritative authors were read and discussed. Besides these there were shop operation courses on steel foundry, gray iron and non-ferrous practice at 4 p. m. four days of the week. Round table luncheons, so popular and fruitful, were not neglected, there being three of these on malleable iron, steel castings and non-ferrous foundry practice.

Mention should be made of the attendance. Keen interest was shown in nearly every subject—the largest crowds assembling at the gray iron and the cost accounting sessions. The attendance at the non-ferrous meetings was surprisingly large. That the shop operation courses, first tried last year in Chicago on gray iron, are popular was proved by the great interest in the three courses this year, all superintended by leading practical men.

A commendable feature of the technical programs was their confinement to a small number of papers. Opportunity was afforded for more liberal discussion, chairmen were not pressed for time and foundrymen were not over-burdened with literature. Successful technical sessions depend on a live chairman, on few and brief papers, and on up-to-the-minute topics.

Evidently outstanding interest was divided among gray iron, cost accounting and malleable practices. Papers on the steel foundry this year were largely concerned with sand problems. Papers on melting processes in various lines were lacking, as were also any data on a new steel foundry development of great importance—rustless steel castings. Atten-

tion to the latter is promised for next year.

S. T. Johnson Made Honorary Member

BESIDES the election of officers for the coming year and of directors for three years at the regular annual business meeting, Monday afternoon, May 12, the association confirmed the selection by the board of directors of S. T. Johnson, S. Obermayer Co., Chicago, and a past-president, as an honorary member. Mr. Johnson in a graceful speech of acceptance thanked the association and said he had been connected with the A. F. A. since its inception.

Prominent Speakers at the Banquet

ABANQUET was held in the ballroom of the Hotel Cleveland, Thursday evening, May 15. Many ladies graced the unusually large attendance, and the post-prandial fare was of the best. Besides a good orchestra, a fine vocal program interspersed the speeches. The songs were delightfully presented by Genevieve Irene Rowe of Wooster, Ohio, winner of the Atwater-Kent audition of 1929. She was accompanied by her father, Neil O. Rowe, dean of the Wooster Conservatory of Music. Dancing followed the banquet.

Word from a British Metallurgist

President Erb, after a brief address, introduced Dr. William E. Wickenden, president of Case School of Applied Science, Cleveland, as toastmaster. Before his delivery of a brief address on "Science Applied to Industry," Dr. Wickenden called upon a prominent British visitor, seated at the head table. J. T. Goodwin, vice-chairman of the British Cast Iron Research Association, who is in America on busi-

ness, delivered a happy speech. He emphasized the large educational help of the equipment phase of the large exhibition and congratulated the gray iron industry on the formation, a year or two ago, of the Gray Iron Institute, which he believed would be of as much benefit to the industry as the similar organization in England is to the Institution of British Foundrymen, whose greetings he brought.

Science and Industry Must Collaborate

Dr. Wickenden's address was forceful and instructive. He emphasized particularly the dependence of industry on man-power, technically trained. In this respect, American industries are under-manned, because in production activities especially we are the only nation in which only one man in 11 is a scientifically trained man. He pleaded for closer collaboration between science and industry.

Plans for the Chicago Exposition in 1933

As chief speaker of the evening, Dr. Wickenden introduced Dr. Allen D. Albert of Chicago who delivered an address on "The New Economic Revolution." Dr. Albert is assistant to Rufus C. Dawes, president of the Century of Progress Celebration to be held in Chicago in 1933. He outlined the changes that science and research have wrought in the economic and industrial life of the nation in almost every field and recounted some of the plans of the promoters of the 1933 exposition to portray the progress of these changes in the past 100 years.

Referring to developments in aluminum, he said that steel manufacturers are watching carefully possible competition from aluminum and that one building at the exposition



will be entirely constructed of aluminum and its alloys.

Penton Medal Awarded to H. A. Schwartz

IT is the custom of the association to bestow certain medals at annual conventions. There are several of these. This year only one was awarded—the John A. Penton gold medal—established in 1920 in recognition of outstanding contributions to the foundry industry.

The recipient this year is Harry A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland. The donor was present and in person bestowed the medal and certificate with an appropriate speech. The fact that both men are Cleveland citizens lent a local color to the occasion.

Mr. Schwartz's work in malleable iron is well known to foundry metallurgists and to steel treaters also. He has contributed many important papers to foundrymen's and steel treaters' conventions and his high place in

Records That Were Broken

	Cleveland	Detroit*
	1930	1926
Registration	7,100	5,900
Exhibitors	249	248
Floor space,		
sq. ft.	84,000	81,000

*International Convention and Exhibit.

both societies, as well as in the industrial world, is unquestioned.

Special Dinners and Prizes

TWO special dinners were held during the week. A very large one was the exhibitors' dinner Tuesday evening, May 13, at the Statler Hotel, with which the Foundry Equipment Association joined. The other one was the foundry instructors' dinner at the Statler Hotel Wednesday evening, May 14. Instructors from universities, colleges and engineering

institutions that offer courses in foundry practice were the chief guests. Prof. A. E. Wells, director, engineering shop laboratories, Cornell University, presided.

For one of the best papers at last year's convention at Chicago on "Foreman Training," A. D. Lynch, Ohio Brass Co., was given a prize. A. L. Boegehold, metallurgist, research laboratories, General Motors Co., Detroit, was awarded a prize for his paper, "Quality of Pig Iron and Castings as Affected by Blast Furnace Practice," also one of the best papers at that convention.

Largest Exhibit Had Many Features

THE foundry exhibit was generally regarded as the finest and most complete display of foundry equipment, materials and supplies ever brought together and showed forcibly the steady advance that is being made by makers of molding, handling, cleaning and other foundry equipment in further improving the efficiency

Here and There During Foundry Week



EVERYWHERE were evidences of the splendid work of the Cleveland foundrymen's committee on arrangements, of which Walter L. Seelbach was chairman. Details of reception and welcome, plant visitation, ladies' entertainment and so on were carefully attended to.

* * *

SPEAKING of dancing — two British visitors demonstrated that they could "trip the light fantastic" to American jazz. J. G. Pearce was frequently pointed out as a graceful dancer, and J. T. Goodwin was his equal. The former delivered an exchange paper at one of the gray iron sessions and the other spoke at the banquet.

* * *



ALMOST omnipresent was "Bob" Kennedy, technical secretary. The smooth handling of the many simultaneous technical sessions was due to his vigilance, thoroughness and care.

* * *

LEADERS of three associations — Gray Iron Institute, Steel Founders Society of America and the Malleable Iron Research Institute — were active in promoting publicity for their respective highly important organizations. A two-day meeting of the S. F. S. A. was a feature of the week.

SECRETARIES of two large technical organizations were conspicuous among the sightseers. W. H. Eisenman of the American Society for Steel Treating, Cleveland, was making mental comparisons, and C. L. Warwick of the American Society for Testing Materials, Philadelphia, was paying his first visit to an A. F. A. exposition. Early in the week J. K. Rittenhouse, assistant treasurer of the A. S. T. M., was a visitor and exhibitor.

* * *



"I'VE heard a lot of talk" — is the title of a unique booklet found at the booth of the International Nickel Co. It has been discovered that one of the staff of that organization has marked ability in both rhyme and art, and full advantage has been taken of it. Further examples are eagerly anticipated.

* * *



AN innovation at the banquet was a pleasant surprise to all. Each lady (and there were many) was presented with a beautiful bouquet of pink roses, which were worn with an elastic on the wrist. A single pink rosebud was pinned on the lapel of each gentleman. It was the happy thought of the Cleveland local committee.



TO the gratification of many, two dances were provided. Both were delightful affairs — one was held the first evening, under the auspices of the Cleveland local committee, in the fine ballroom of the Auditorium. The other followed the banquet in the ballroom of the Hotel Cleveland.

* * *

THERE was a large gathering during the week of some of those foundrymen and their wives who were at the international convention in England last June. A special party was organized, totaling over 80, including some wives who did not go abroad and a dinner was served them on one of the Detroit steamers in the harbor.

* * *



NEW badges attracted favorable comment. Instead of the usual stereotyped metal badge container for the name, there was provided a paper or parchment one on which was printed "Member," "Exhibitor," or "Member-Exhibitor." They were attractive and an improvement over the older one.

* * *

MEMBERS were presented with a neat program holder. An imitation leather case contained the printed program booklet and a pad of note paper. On the cover was embossed "Convention Program," with the A. F. A. seal below.

New Directors of A. F. A. for Next Year



C. S. Anderson



D. M. Scott



H. R. Culling



R. M. Maull



Fred Erb

and labor-saving features of their products.

There were 249 commercial exhibitors and the floor space occupied was 84,000 sq. ft. as compared with 81,000 sq. ft., the largest exhibit ever held previously, in Detroit in 1926. It is believed to have been the largest industrial show set up on the ground ever held aside from some of the exhibits of transportation and other equipment, at which most of the displays are street cars, buses, automobiles and other wheel-mounted equipment.

Attendance, which exceeded 7000, broke all previous records at foundry shows by over 1000. This was particularly gratifying in view of the fact that some doubt had been felt before the show that the attendance would reach former records because of the present reduced activity in the foundry industry.

The location and arrangement of the exhibit at the Cleveland Auditorium was convenient for visitors because, with the construction of wings to the building since the last Foundry Convention in Cleveland in 1923, all technical and business sessions could be held in rooms adjoining the exposition space. The auditorium was filled largely with displays of metals and various foundry supplies. Melting, molding, material handling, cleaning, and other equipment was exhibited in the annex, and considerable of this equipment was in operation.

Educational Exhibits a New Departure

A new feature of the show was the educational exhibits of about a score of engineering schools and universities. There were 38 complimentary exhibits in all, including those by schools and various associations and societies. These were located in the arcade connecting the main exhibition rooms.

Displays of material-handling equip-

ment appeared to be larger than at any previous foundry show. This included every type of handling equipment that can be applied to various foundry operations. With increased speed in molding and in other foundry operations has come a demand for more efficient and more speedy material-handling equipment, which makers of that equipment are able to supply because of recent improvements in various types of handling devices. Displays of sand blast equipment included some new designs of sand blast machines providing increased production and added labor-saving features in their operation. The displays of

metals and alloys was said to be larger than ever before.

Continuous Foundry a New Feature

A STRIKING exhibit that attracted a great deal of attention was a continuous foundry in which metal was melted one heat per hour in a 1000-lb. furnace; molds were made on five molding machines, set on an intermittent type conveyor, which moved them to the pouring station. After pouring the molds were moved on to the shakeout. The molds were shaken out over an apron conveyor, and the castings and sand were carried upward and discharged over suitable equipment. The castings traveled down a chute to a tote box, in which they were moved to the adjoining cleaning equipment. The sand passed to the system in which it is prepared and on to the hoppers over the molding machine. Metal was poured into a bull ladle handled by a monorail hoist and transferred to hand ladles supported on carriers.

The furnace equipment was installed by the Pittsburgh Electric Furnace Co.; the molding machines, mold conveyor and sand treating and handling equipment, by the Osborn Mfg. Co.; the overhead monorail handling equipment and pouring device, by the Cleveland Electric Tram-rail Division of the Cleveland Crane & Engineering Co., and the cleaning equipment, by the W. W. Sly Mfg. Co.

Cast and Malleable Iron Exhibits

The exhibit of the Gray Iron Institute included castings for a wide range of uses, showing the adaptability of gray iron for parts requiring high quality and fine finish. Interesting examples of castings with fine finish that were shown included airplane cylinders. There were also a number of exhibits of architectural and art castings, including lighting fixtures showing the high-quality, ar-

Officers Elected for Next Year

President: N. K. B. Patch, secretary, Lumen Bearing Co., Buffalo, N. Y.

Vice-President: E. H. Ballard, superintendent in charge of foundries, General Electric Co., Lynn, Mass.

Directors for 3 years:

Fred Erb, retiring president, Erb-Joyce Foundry Co., Detroit.

C. S. Anderson, vice-president and general manager, Belle City Malleable Iron Co., Racine, Wis.

H. R. Culling, vice-president, Carondelet Foundry Co., St. Louis.

R. M. Maull, treasurer and sales manager, Tabor Mfg. Co., Philadelphia.

D. M. Scott, vice-president, Symington Co., Rochester, N. Y.



N. K. B. Patch



E. H. Ballard



W. L. Seelbach

FOR President and Vice-President for 1930-1931, Mr. Patch and Mr. Ballard Were Chosen Respectively. Mr. Seelbach Was Chairman of the Cleveland Committee, Which Was a Large Factor in the Success of Foundry Week

considerable interest, is the Brackelsberg furnace, which is used abroad. The first of these furnaces to be installed in this country is now being erected in a Lockport, N. Y., foundry. The furnace is fired with pulverized coal, the complete unit consisting of the coal-pulverizing equipment, tilting and rotating mechanism and the furnace drum. It is a batch furnace made in 2½ to 10-ton sizes, the drum of the large unit being approximately 8 ft. in diameter and 20 ft. long.

Alloy briquettes to be introduced in the cupola to increase the tensile strength and improve other physical qualities were exhibited by a New York company that has been granted a license covering the manufacture and sale of the briquettes in this country and Canada. The briquettes (or "pakets" as they are designated) are being used in several European countries, but their introduction in this country is just starting. They are made in two forms, one a silicon and the other a silicon-manganese paket. The material is firmly held together by a binder. Pakets are put in the cupola charge, with which they are fused, and it is stated that there is no loss of alloy, because they do not melt until they reach the molten bath.

tistic work and excellent detail that can be produced in cast iron.

The Malleable Iron Research Institute exhibited a number of castings, including one that showed what can be accomplished in annealing thick sections. This was a compressor cross-head having a section 5 in. thick.

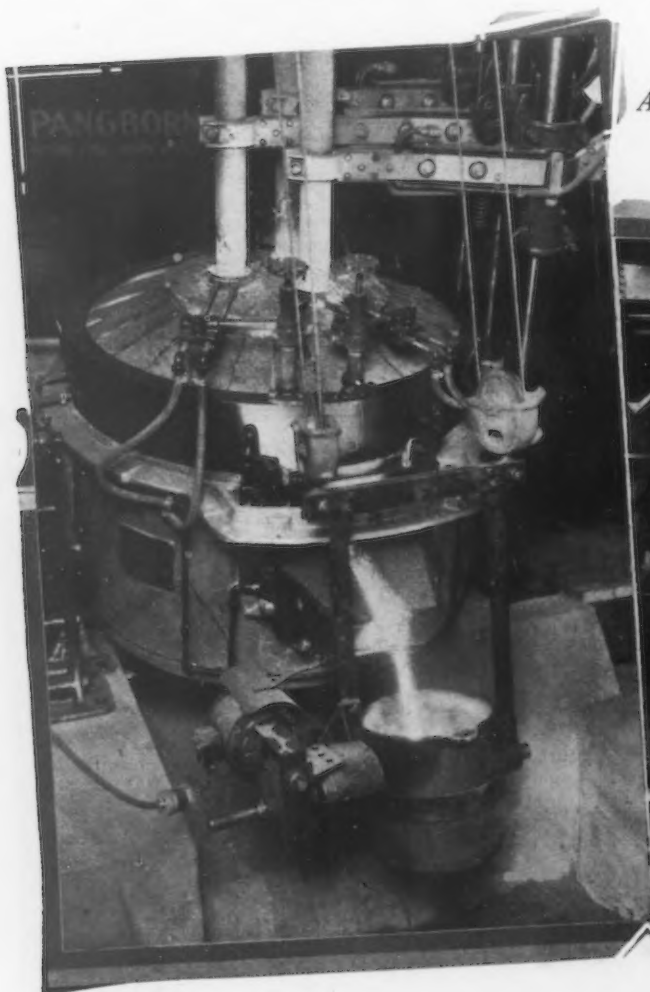
Through the section, 5 by 4½ in., a 1 11/16-in. hole was drilled.

Melting Equipment Displayed

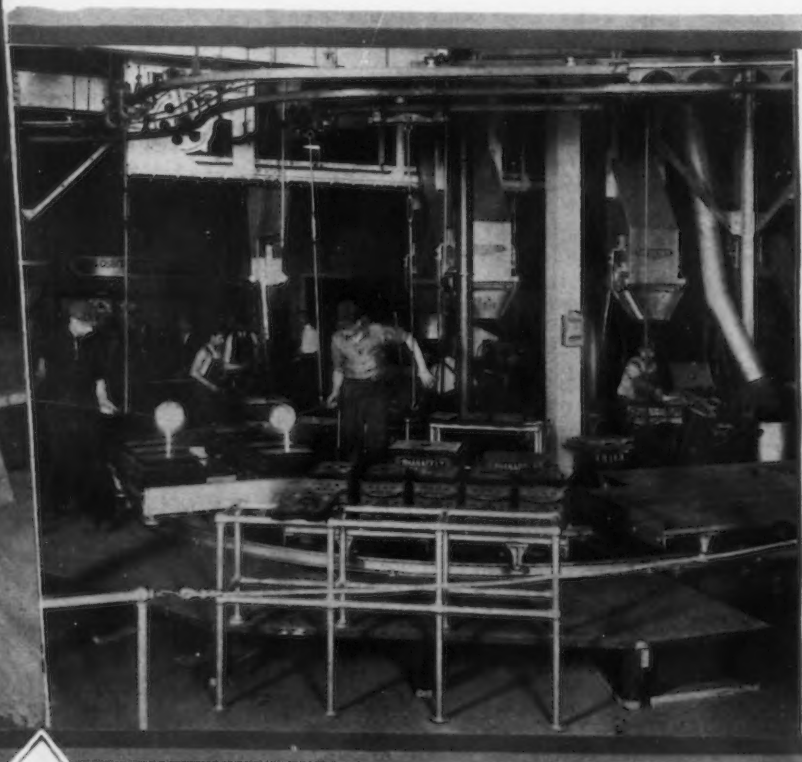
Exhibits of melting equipment included a rotary furnace, shown in model form for melting malleable and gray iron. This unit, which attracted

Miscellaneous Exhibits of Interest

Exhibits of sand blast equipment included a new dumping, tilting mill designed to increase production speed.



A Continuous Foundry Operation from Melting to



This loads in any position under power and dumps under power without stopping. The time cycle from blasting to dumping and back to loading position is said to be less than 60 sec.

Cores are knocked out by water pressure in a new type of equipment that was exhibited. The castings are placed on cradles on a rotary table in a water-tight chamber and the water is applied under a 400-lb. pressure. The water and sands pass to settling pots. The sand is reclaimed and the water can be reused if desired.

A new design of floor-type shake-out for handling molds as large as 20 tons in size was included in the exhibits.

The hot blast process for cupolas was displayed for the first time at a foundry show by charts and photographs.

A talking motion picture describing and illustrating foundry methods and operations, which was shown by one manufacturer of molding equipment, was one of the unique and interesting features of the show.

While actual orders for equipment were not so large as at some previous exhibitions, the number of inquiries received and prospects uncovered was large.

The Convention in 1931

Next year, following the plan tentatively adopted a year ago, a small exhibition will be held, large working



S. T. Johnston



H. A. Schwartz



C. E. Hoyt

THE Association's New Honorary Member Is Mr. Johnston, While Mr. Schwartz Is This Year's Medalist. Mr. Hoyt, Executive Secretary of the A. F. A., Has Guided Its Activities for Many Years

equipment being eliminated. Marked success attended this plan at the convention in Chicago in April, 1929, at the Hotel Stevens. A comprehensive small exhibition was held in the display room of the hotel.

A place for the convention in 1931 has not yet been decided upon. Several locations were talked about last

week. Probably an Eastern city will be selected. Among those mentioned are Boston, Toronto, Rochester and Atlantic City. Sentiment seemed to favor Toronto. Undeniably Cleveland with its Auditorium and hotel facilities is ideal, but the demands on local foundrymen preclude its selection too often.

Final Product as Carried on by Four Companies



Good Management Required at Top

Scientific Principles Applied in Lower Ranges Should Be
Extended to Upper Tiers—Bonuses for
Executives Urged

MORE science and less politics in the top ranks of large-scale organizations was advocated by Col. M. C. Rorty, vice-president, International Telephone & Telegraph Co., in an address on "The Organization of the Managing Group," before the three-day annual convention of the American Management Association in New York last week.

Having outlined the development of the corporate system and some of the forward steps in the management of large-scale business, Colonel Rorty took up the relations of such business to the managing group. These relations, he pointed out, constitute perhaps the most important problem of all, and one that is radically distinct from that affecting the great body of corporation employees.

"If an organization is good at the top, it is quite certain to be good throughout all its ranks," he said. "But an organization may violate all the rules of good management at the top and still show a skilled and considerate handling of the lower ranges of its personnel."

"The reason for this variability between the top and the bottom of business organizations is obvious. The personnel manager, as a staff worker in a large organization, cannot begin to make his influence felt in the two or three upper tiers of management. He can often exert a compelling influence on the conduct of foremen and of superintendents and unit managers; he can systematize plans and procedures for employment, for fixing wage scales, and for the judicial hearing and adjusting of grievances in the lower ranges of the organization. But he cannot greatly influence the vice-presidents, even if he himself ranks as one. Still less can he indicate to the president or chairman the effect that violations of sound managerial principles in these upper ranges of the organization may have in ruining morale and in threatening the very integrity of the enterprise."

Science Ceases to Prevail in Upper Ranges

Colonel Rorty declared that this condition is typical of, perhaps, nine out of ten large-scale businesses, each of which is faced with the serious problem of extending into the upper corporation organization ranges, the principles and practices of good management which are beginning to be

accepted as a matter of course in the lower ranges.

A distinctly "new era" in business today was said to be found in the fact that many great corporations do not attempt to improve operating results through reductions in wages. "Current wage levels are accepted as a matter of course, with the expectation that they will tend to rise rather than fall. This point of view is founded, not upon the shifting sands of sentimentalism, but upon the solid rock of enlightened self-interest," said Colonel Rorty.

But a still greater step forward was said to have come with the establishment of personnel departments in large corporations and the assignments to such departments of the staff responsibility for the studies necessary to healthful working conditions and just and considerate treatment of the mass of employees.

Colonel Rorty stressed developing of leadership as a major task of management. On this he said, in part: "The final and greatest of management problems is safeguarding and developing the human element in the upper ranges of corporate organizations. The final justification of management, as a science, will come when it adds to its economic usefulness a proved contribution to the development of human individuality and character. This is an obligation of, but not a burden upon, business. The business organization that safeguards the human element, that builds real men, will, with equal certainty, safeguard and build real profits."

Principles of Incentives for Executives

THAT mergers are detrimental to the effectiveness of the important men in the merged companies and that drastic steps must be taken to overcome this disadvantage were points of emphasis in an address by J. P. Jordan, Stevenson, Harrison & Jordan, New York.

Mr. Jordan took the position that as companies increase in size, either through natural growth or through mergers, "the men who were big fishes in little puddles become little fishes in big puddles," with the result that they lose the sense of responsibility originally felt. They become, therefore, less efficient as producers.

"It is doubtful," Mr. Jordan continued, "if the majority of men in

executive or semi-executive positions render as much as a 50 per cent yield of their possible effectiveness."

These statements were used as the background for the position that every executive and key man should be made a participant in a plan whereby he would receive extra remuneration for producing better than usual results. The purpose of such a plan would be to furnish stimulation for greater interest and effort to offset the tendency to relaxing of effort.

Mr. Jordan expressed disapproval of paying extra remuneration or bonuses in the form of stock or by any other method that involves a paternalistic attitude on the part of the company. He maintained that when any man devotes himself to super-effort in order to produce results he is entitled to his bonus earnings in cash, to spend or invest as he pleases.

"Strictly profit-sharing plans do not furnish an adequate incentive to anyone below the line of chief executives," he went on to say. "That is, the superintendent of a manufacturing department should not be subjected to penalties that are due to poor results from other departments when he saves money in his own department. All incentive plans should be so arranged that bonuses are made or lost according to the results accomplished in the operations directly under the supervision of each key man."

In concluding, Mr. Jordan drew a picture of the return of key men to a state of proprietorship by putting them on a basis whereby their bonuses would depend upon the results they produced.

Large Savings from Progressive Development Work

In an address on "Management Developments in the Western Electric Co.," C. G. Stoll, vice-president in charge of operations, pointed out that wages in his company are rising while prices are being lowered. At present wages are 215 per cent of 1914, while prices are only 120 per cent of that year's scale.

Although economic conditions account for part of this desirable condition, a contributing factor was said to have been the fact that the company is organized for progress in management. The question "Is there a better way?" is constantly being

Ten Commandments of Management

TEN commandments of good organization were laid down by Col. M. C. Rorty, vice-president, International Telephone & Telegraph Co. These rules, he pointed out, are founded on human experience, which began hundreds of years before large corporations were known, and require little explanation or justification to trained executives. Rule No. 5 was singled out as perhaps the most important, it being frequently violated and its violation unsettling morale. The decalogue follows:

1.—Definite and clean cut responsibilities should be assigned to each executive.

2.—Responsibility should always

be coupled with corresponding authority.

3.—No change should be made in the scope or responsibilities of a position without a definite understanding to that effect on the part of all persons concerned.

4.—No officer or employee, occupying a single position in the organization, should be subject to definite orders from more than one source.

5.—Orders should never be given to subordinates over the head of a responsible officer. Rather than do this the officer in question should be supplanted.

6.—Criticisms of subordinates should, whenever possible, be made privately, and in no case should a subordinate be criticized in the presence of officers or employees of equal or lower rank.

7.—No dispute or difference between officers or employees as to authority or responsibilities should be considered too trivial for prompt and careful adjudication.

8.—Promotions, wage changes, and disciplinary action should always be approved by the officer immediately superior to the one directly responsible.

9.—No officer or employee should ever be required, or expected, to be at the same time an assistant to, and critic of, another.

10.—Any officer whose work is subject to regular inspection should, whenever practicable, be given the assistance and facilities necessary to enable him to maintain an independent check of the quality of his work.

applied to all operations in all departments of the company.

Mr. Stoll showed graphically that the savings resulting from development work in the manufacturing department during 1929 were almost double the cost of the development, the changes and rearrangements of plant that resulted, and the cost of new plant recommended.

The organization and operating principles of the export division of the General Motors Corporation were outlined by E. W. Smith, assistant to the president of that division of General Motors, at the first session of the convention.

Sound Public Relations Worth Cultivating

Other sessions were devoted to discussions of mergers and industry's public relations. At the latter session, David Lawrence, president, *United States Daily*, pointed out that industry needs to interpret itself constantly to the public.

Sound public relations are as worth cultivating by a business concern as it is worthwhile for an individual to have a good reputation in this world, said Mr. Lawrence. For this reason the public relations man of a company should report directly to the president or to the vice-president. He should hold so important a place that he can sit in on all important conferences where matters of company policy are decided. He should be constantly informed by the president as to what is going on within the business. At times he may be able to make a suggestion that will save the company from a serious blunder. He must know the reactions toward the company of people who buy the company's products. He must not be a part of the advertising department, but he must be in the position to advise that department, since one of the

functions of advertising is the creation of good-will.

The entire company should take part in the public relations program, and should feed significant information to the public relations department, Mr. Lawrence continued. The department should be entirely separate from the personnel department, since the latter has to do with internal administration alone.

At the conclusion of this session, a show of hands on the proposal that the American Management Association create a public relations division

indicated a majority in favor of it.

The board of directors of the association has created a shop methods division to deal with the general field of industrial engineering. P. L. Dildine, engineer, B. F. Goodrich Co., has been selected vice-president in charge of this new division. An insurance division, to discuss insurance from the buyers' point of view as a means of protecting companies against business risks, has also been created. New officers of the association were listed in *THE IRON AGE* of May 15, page 1478.

Engineering Construction Running Large

Evidence that the volume of legitimate contract construction, despite a decrease in gross dollar value for all building, is now greater than at the same time in either 1928 or 1929, is revealed in a statistical study just completed by the Associated General Contractors of America, which also shows that a new all-time high record was established in the total award of surface pavement contracts during the first three months of the year. The total of these awards increased 63 per cent over that of the first quarter of 1929, the study indicates.

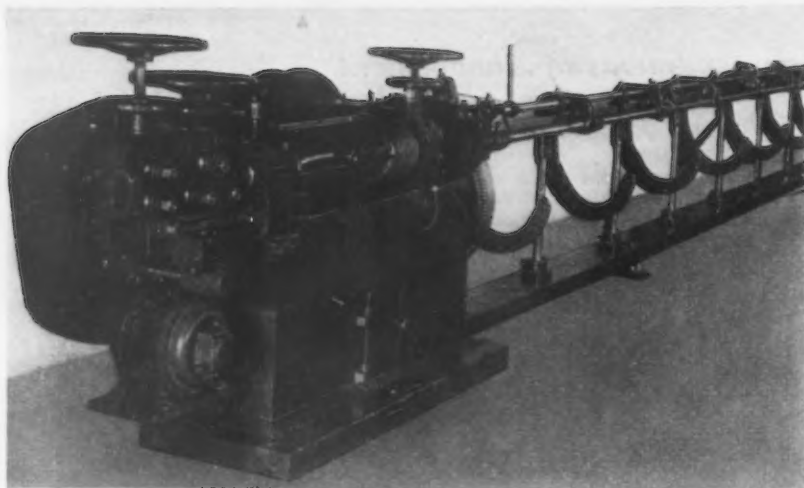
Bearing out its earlier predictions that there is to be an exceptionally large volume of engineering construction this year, the association's analysis discloses that long term State and municipal bond issues for the first quarter ran well in advance of the same period last year, totaling \$106,000,000 for March and averaging \$96,700,000 monthly as compared with \$88,200,000 during the first quarter of the previous year.

According to E. J. Harding, assistant general manager of the Associated General Contractors, the effect of

this public works acceleration is strikingly marked in the phenomenal increase in the total yardage covered in the pavement contracts. During the first three months of 1930, contract awards were made for 27,200,000 sq. yd., as compared with 16,700,000 during the first quarter of 1929. With contemplated work in this field continuing to come forward, and with the increased highway program made possible by upward revision of Federal aid appropriations, Mr. Harding states that engineering construction faces a banner year.

Although the first 14 weeks of the year show a decline in the total value of contracts awarded for the various classes of construction, this decrease is attributed wholly to the elimination of speculative building, which in turn is spurring legitimate construction to greater and sounder activity.

Mr. Harding points out that the net decrease in the grand total embraces a substantial decline in commercial building and a larger drop in residential building—the two fields in which speculative operations had been particularly rampant—whereas in the unspeculative field of all types of legitimate contract work a definite increase is indicated.



Straightener for Steel Rods Up to $\frac{3}{4}$ -In. Diameter

A NEW wire rod straightener, known as No. 8, is in production by Frank L. Wells Co., Kenosha, Wis., builder of special machinery. This machine is of the rotary type, and is designed for straightening either cold-rolled or hot-rolled steel in sizes from $\frac{1}{4}$ -in. up to and including $\frac{3}{4}$ -in. round.

A new departure in this machine is the drive, for which three motors are used. One motor operates the

cut-off, a second motor drives the feed and the third motor operates the flyer. The motors are all controlled by one switch with a relay ahead of each motor, thus eliminating difficulty should any one of the three motors fail in operation.

All castings are made of steel with the exception of the base and the rack. This machine is equipped with feed roll release, so that the feed roll stops while the cut-off is operating.

trunk to the central section. The machines are air clamping by toggle action and each unit is motor driven through silent chain and suitable gears. The upsetting is accomplished by two identical cams actuating two rollers mounted on the slide.

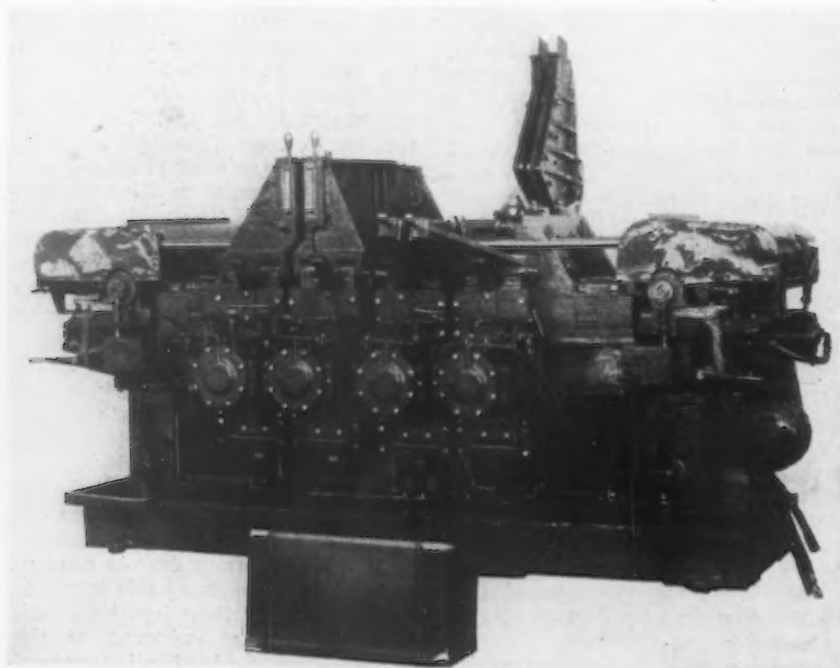
The welding cycle is as follows: The two end stampings are placed in suitable aligning fixtures and the central piece is placed in position. Then the four arms are brought down, the latches are thrown into position, and the air valves turned, which clamps the four arms at either end uniformly and rigidly through the air cylinder and toggle action. Levers on either end are then tripped and the automatic flashing mechanism is started. When the joint is complete the arms are released, the latches are dropped down and the arms swing out of the way; then the trunk is removed and a turn of an air cylinder valve returns both slides to the starting position where it is ready for reloading.

The machine is provided with two 250-kva. continuous duty welding transformers. Dies are of aluminum bronze, and terminal castings are water cooled throughout. The machine weighs approximately 11 tons. It is stated that it will weld at least 60 trunks per hour, with two end seams, each approximately 29 in. long.

Flash Welder for Auto Trunks

FOR welding automobile trunks the special welding machine illustrated has been brought out by the Taylor-Winfield Corporation, Warren, Ohio. It really consists of two separate

welding machines mounted on one base and designed to act in unison in performing identical operations, namely, the flash welding of two stampings that form the ends of the



Double Flash Welder for Making Automobile Trunks. Clamping arms for right hand joint are thrown up and latches tilted forward. Completed trunk in foreground

Corporation Makes Stainless and Heat-Resistant Steels

The United States Steel Corporation, continuing and enlarging its interest in the field of alloy steels, is now engaged, through its subsidiary companies, in the production and finishing of stainless and heat-resistant low-carbon steels.

In general, there are two classes of alloys in course of production, straight chromium steels and chromium-nickel steels. Within each class a series of compositions or grades will be available, so that a variety of requirements may be met from the standpoint both of physical properties and of chemical characteristics. Typical examples of the two classes are USS chromium steel 16-18 and USS chromium-nickel steel 18 and 8. All of these alloy steels are electric furnace products.

The American Steel & Wire Co., American Sheet & Tin Plate Co., Carnegie Steel Co., Illinois Steel Co., and the National Tube Co., are each producing and further developing those lines of products appropriate to their respective activities. The Illinois Steel Co., through the facilities afforded by its electric furnaces at South Chicago, has been engaged in the production of alloys on a substantial scale, including the stainless and heat-resistant alloy steels. Its equipment provides capacity sufficient to supply not only the needs of its own finishing departments, but semi-finished materials in large quantities for subsequent conversion to finished products by other subsidiaries of the corporation.

New Heavy-Duty Billet Shear

Steel-Plate Frame Strengthened by Welding Heavy Bars
Between Members—Stripper Reaches
Close to Knives

THE high-carbon steel plates of the heavy "armor plate" billet shears illustrated are joined by means of heavy bars are welded to each plate. This, states the Buffalo Forge Co., Buffalo, which recently furnished the machine for work in a large automotive plant, provides an unusually dependable construction.

These bars extend the full length of the frames on each side of the plunger and are welded along all four edges, the welded sections being in tension only. This is accomplished by running heavy alloy steel studs through both frames and stiffeners in the rear, which studs pass through slits in the plunger near the knives, thus overcoming any tendency of the frames to spread. Patents covering this feature have been applied for.

In addition to this welding of the frame, heavy disks are welded to the rear frame, which is lighter than the front frame, at the points where the main and intermediate bearings are located. The knife-holder, which is a steel casting and is in one piece with the stripper-holder, is also welded to the frame, as are the brackets.

The ram is an alloy-steel casting, and the end which engages the plunger in a hardened tool-steel seat is heat treated for maximum wear. The plunger is counterbalanced and is

adjustable by two gibs, one on each side, to facilitate centering of the knives. The reaction due to shearing is taken up by two bronze guides behind the plunger. The knife-seats in the plunger, front frame and knife-holder are lined with hardened tool-steel pieces, the area of which is greater than that of the knives, preventing pounding down of the seats.

Six splines at the end of the eccentric transmit the power from the main gear clutch; there are no inserted keys. Clutch and gear jaws are faced with interchangeable hardened tool-steel pieces and thrust is on an adjustable bronze washer. Both the intermediate and oil-ring bearings are inserted in the frames, rather than mounted in separate overhung cast iron housings. The outboard bearing is of self-aligning roller type. All bearings, the slide and other moving parts are lubricated automatically by means of a force feed system. The machine may be tripped by hand or foot or locked to operate continuously. A feature emphasized is the

HEAVY Disks Are Welded to the Rear Frame of the Billet Shear, Where Main and Intermediate Bearings Are Located. The knife-holder and stripper is in one piece, which is welded to the frame

stripper, which, in reaching close to the knives, permits using up material to the last end without undue waste. An adjustable guide roller is provided and a tilting gage can be furnished. As a safety guard against accidental overload a shearing pin is provided in the flywheel hub, the wheel itself being bronze bushed to prevent its freezing to the shaft.

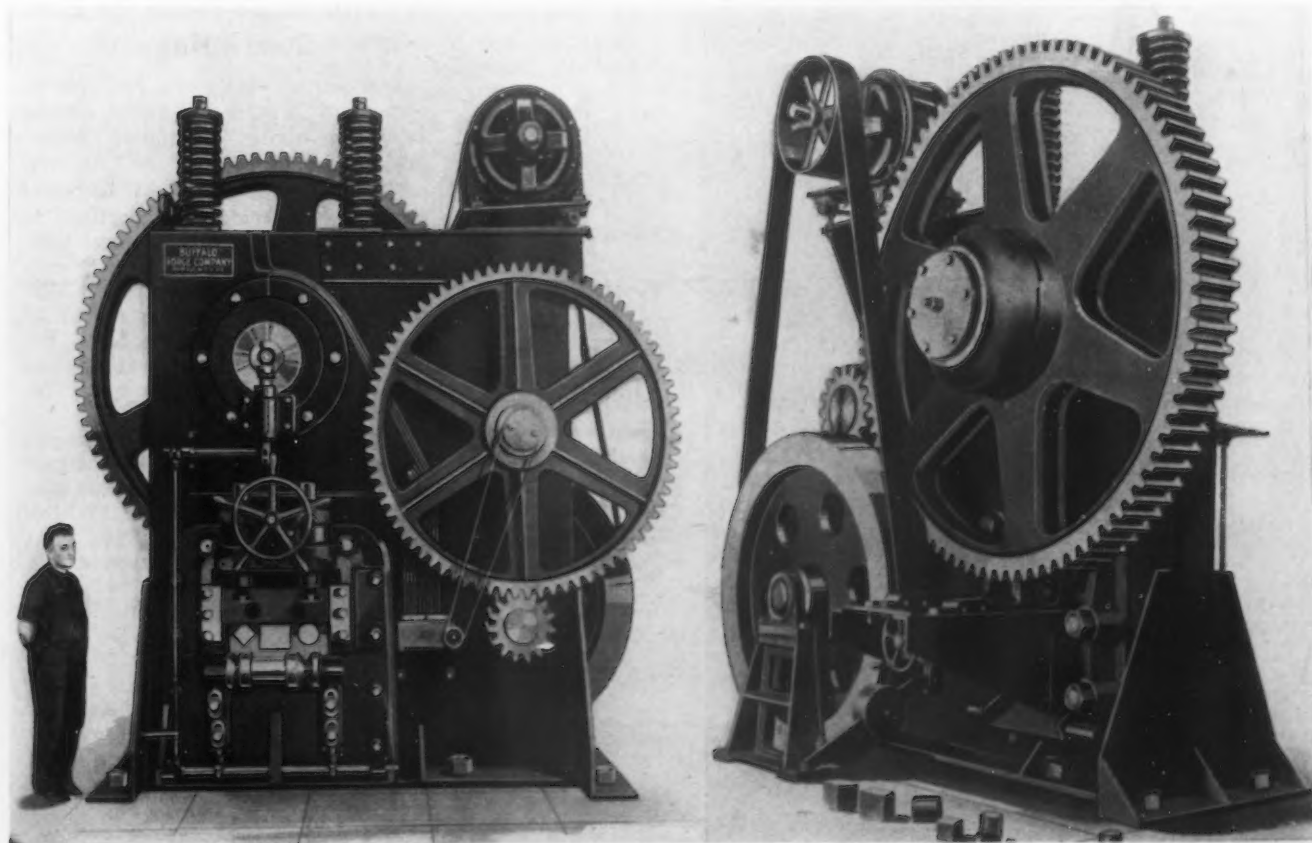
Twelve sizes of the machine, with bar capacity ranging from 1 to 8½ in., are built. The No. 15 billet shear illustrated has capacity for 7-in. square or 7¼-in. round 0.15 per cent carbon steel bars.

Southwark Portable Machine for Bend Tests

The Oxweld portable testing machine built by the Southwark Foundry & Machine Co., Philadelphia, and described in last week's issue, page 1475, is not, in the form shown, adapted for bend tests. Bend tests on welds and tests of concrete cylinders are made on a compression machine that is a modification of the unit described. The tensile testing unit illustrated last week has an important use in qualifying welders.

Warner & Swasey Celebrate Fiftieth Anniversary

The Warner & Swasey Co., Cleveland, will celebrate the fiftieth anniversary of the founding of the firm of Warner & Swasey, May 23. An anniversary program more or less informal will be carried out during the afternoon.



Applies Hydraulic Feed to Car Wheel Borer

APPPLICATION of Oilgear feed to the Betts heavy-duty car wheel borer has been announced by the Consolidated Machine Tool Corporation of America, Rochester, N. Y. With the feeds and rapid traverse controlled by oil pressure, heavier feeds and faster production are obtained and feed gearing is eliminated. The entire cycle of boring operation being automatic, the operator is merely required to start the machine, and is free to do other work while the car wheel is being bored.

The car wheel is placed on the table by means of the hoist furnished with the machine, which hoist may be either mechanically or air-operated and either of single or double type. Chucking of the wheel takes place automatically with the starting of the machine.

The boring bar, fitted with roughing, finishing and chamfering cutters, descends quickly by rapid traverse as soon as the feed lever is thrown in. As the roughing cutter reaches the bore its speed is automatically reduced to the proper rate for rough boring. Upon completion of the roughing cut the rate of feed changes so that the finishing cutter enters the work automatically at the proper finishing feed. Following the finishing cut, the edge of the work is automatically chamfered by the chamfering cutter, whereupon the boring bar returns automatically by rapid traverse to its initial position.

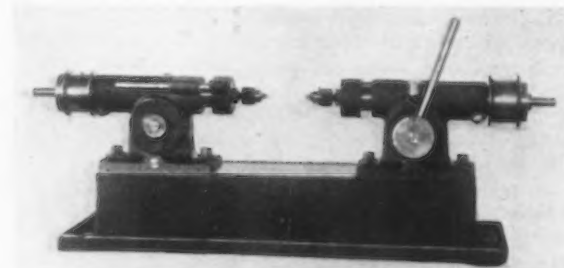
Four table speeds are obtainable through hardened steel gears that

run in oil. The feed rate can be changed instantly under cut, if desired, through knobs conveniently located, and the machine can be stopped at any point in the operating cycle. A hub facing head arranged with Oilgear feed may also be applied to the machine.

Bench-Type High-Speed Duplex Drill

FOR simultaneously drilling or countersinking the ends of rods and similar pieces on a production basis, the Langelier Mfg. Co., Prov-

THE Ends of Rods and Similar Pieces Can Be Drilled or Countersunk Simultaneously. The spindles have capacity for drills up to $\frac{3}{8}$ in.



idence, R. I., is offering the small bench-type high-speed duplex drilling unit illustrated.

The drilling heads are bolted to the bed in a fixed position to suit the length of work they are to be drilled. The heat treated and ground drilling spindles run in phosphor-bronze bearings and are provided with ball thrust bearings for counteracting drill

thrust. They are mounted in feed sleeves having a maximum feed range of 3 in., and each feed sleeve has a drilling stop. The spindles can be operated at speeds up to 6000 r.p.m., and have capacity to take up to $\frac{3}{8}$ -in. drills. The spindles are driven by ball-bearing pulleys which can be belt-connected to a motor or to an overhead countershaft.

Drilling feeds are operated by the hand lever on the right-hand head. The feeds for both drilling heads are interconnected by levers and a connecting lock at the rear of the machine. Bench space 10 x 36 in. is occupied, and the machine weighs ap-

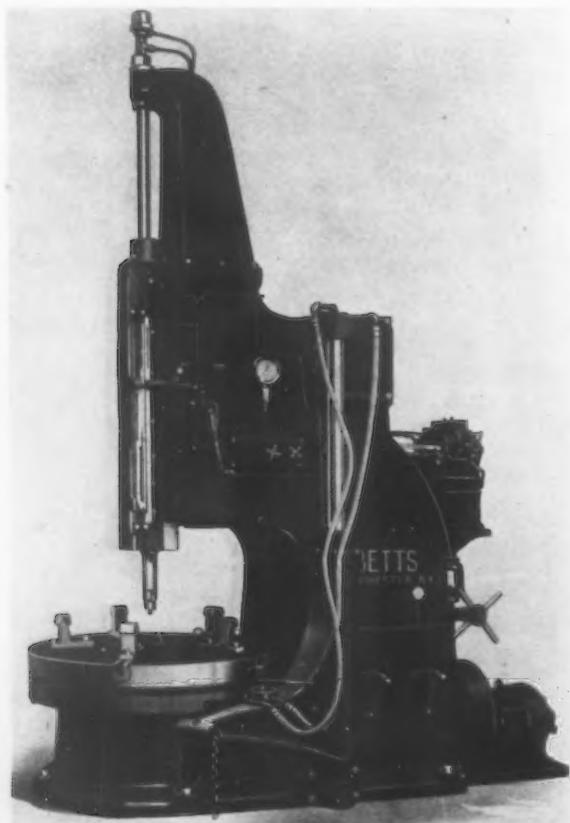
proximately 200 lb. Several modified forms can be furnished. Some of these are mounted on a table and legs with motor drive for each head from underneath and others are arranged with an automatic feed release in the right-hand head when holes have to be drilled through the entire length of the work.

Awards to Be Made for Best Steel Bridge

Designers, fabricators, builders or owners of bridges completed during 1929 are invited to submit photographs of them before June 1, in competition "for the most aesthetic solutions of steel bridge construction" to the American Institute of Steel Construction, New York. The only condition placed upon the entries is that the bridges shall be constructed of steel. Awards will be made to the best small structure (costing less than \$200,000) and to the best large structure.

Accompanying the photographs should be the name of the structure and its location, the total cost, the engineer, architect, builder, fabricator, erector, owner, the date upon which the bridge was completed and open to traffic. Drawings and other construction data will be required of these bridges selected for the prize awards.

Those bridges in their class judged to be the most outstanding examples of good bridge architecture will be decorated with suitable bronze plaques, and diplomas given the architect, engineer, builder and owner as mementos of the occasion.



THE Cycle of Operations On the Car Wheel Is Entirely Automatic. As the machine is started the wheel is chucked automatically. A hub facing head, hydraulically actuated, may be applied

Heavy Output May Force Prices Lower

BY LEWIS H. HANEY

Director, New York University Bureau of Business Research

OUR measurements of the steel industry covering April give the results shown in the table. Both production figures are adjusted for seasonal variation and "normal growth."

	April	Month Ago	Year Ago	March, 1924
Ingot output	105.4	100.0	130.0	110.4
Unfilled orders, United States Steel Corporation	99.7	101.2	101.3	106.0
Finished steel price composite	89.5	91.2	95.6	108.8
Pig iron production	103.8	102.2	120.2	113.5
Pig iron price composite ..	82.9	83.0	86.6	106.6

We note that the trend of production was upward in April, while unfilled orders (adjusted) and prices declined. It is common in this industry to find prices declining when production advances. It is not unheard of for production to increase when unfilled orders decline, though this is not so common.

Nevertheless, it is difficult to put a favorable interpretation on such a situation unless and until (1) production has fallen so long and so low that supply has been thoroughly adjusted to demand and (2) a general upturn in business activity is at hand. It seems doubtful if either of these conditions now exists.

Total steel production has been somewhat above current requirements, which might be inferred from the above-normal level of production and the persistent weakness in prices. We have yet to see any strong evidence of prospects for an early business recovery.

On the whole, the April figures show some resemblance to those found in early 1924, and this is the reason for the fourth column in the table. In March of that year, production of steel increased more than usual, unfilled orders (adjusted) declined and prices broke. The resemblance, however, is far from perfect. It does not seem likely that there will now be any such further decline in steel production as was necessary in the period between

March and July, 1924; and steel prices are so much lower than then that so large a further decline is almost inconceivable.

Moreover, pig iron production is neither so far above "normal" nor so much out of line with steel production as it was in March, 1924.

But it does look as though there will be some further downward adjustment in production of steel and pig iron, and this readjustment may be accompanied by further yielding in the price structure. Any such developments are likely to be orderly and moderate in scope, but the trend seems fairly clear.

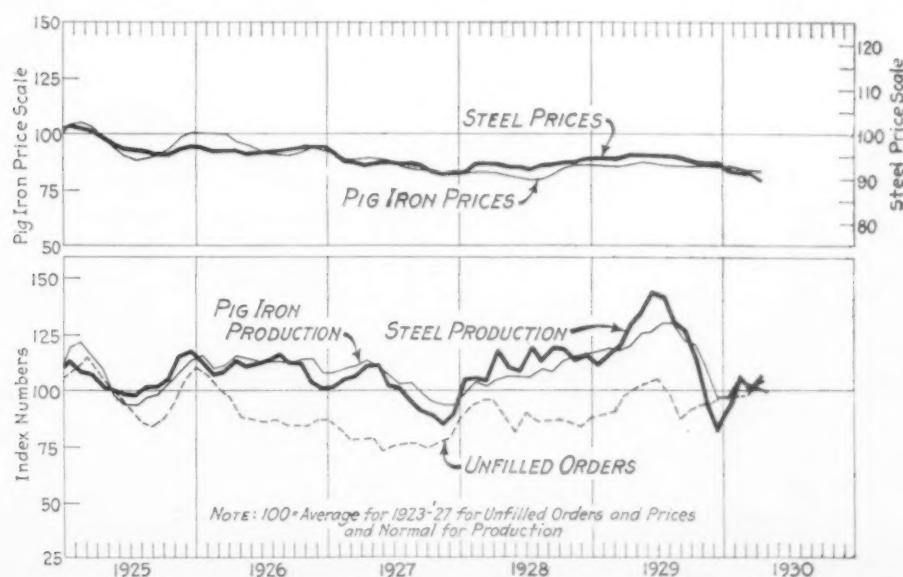
Prices a Little Out of Line

Pig iron and steel scrap prices are in fairly normal relation (though, if anything, scrap is still a little high), but both materials are dear in comparison with the average price of finished steel. With coke markets weaker, it seems that they must yield a little further to pressure from above.

Average daily pig iron production gained on the average daily ingot output. In view of the decline in finished steel prices, this made weakness in pig iron markets almost inevitable. Whether the reductions announced last week are sufficient is doubtful.

No recovery in the average price of finished steel is to be expected until the Bradstreet index of commodity prices has moved upward for two or three months. Meanwhile, steel prices are likely to drift lower.

There is a fair volume of heavy construction which supports the demand for structural steel. But for some time railroads, residential building, automobile production and the machine tool business have not been sufficient to supply a normal percentage of capacity. Now that the farm situation and export demand seem to be slipping, dullness this summer is likely to be pronounced.



WITH Production Still Above Normal Demand, Further Price Weakness May Be Expected, Especially in Pig Iron and Scrap

This Issue in Brief

Budget system lowers foundry costs. Low cost figure aimed at is bettered in actual performance. Budget drags hidden wastes to light and provides a clear conception of costs. Budget enabled a steel foundry to exceed its sales quota and increase its profits in the face of higher material costs.—Page 1538.

* * *

Machining properties of steel can not be determined by chemical analysis. Machinability will vary greatly with the mode of distribution of the carbon.—Page 1536.

* * *

Difficulties in machining malleable iron castings are due mainly to annealing practice, says engineer. Materials from which the castings are made are of lesser importance.—Page 1533.

* * *

Is money being wasted by making steel chemical specifications unnecessarily precise? Steels of the same compositions may differ in physical properties. The purchaser is really interested in the structure of the material supplied; not in the elements that are present. Tolerance limits are uneconomically close in many cases.—Page 1536.

* * *

Machinability of malleable iron is very largely determined by carbon content, investigator finds. In not every case is the outer skin of the casting more difficult to machine than the heart. Carbon content does not affect machinability, says another. Phosphorus and silicon are the governing factors.—Page 1533.

* * *

Malleable foundryman reports 45 heats as average life of cast iron pots. Small amounts of alloys in the pots have little effect on oxidation, he believes, but may prevent warpage and growth in steel pots.—Page 1534.

Galvanized coatings of good bending qualities are obtained by avoiding the iron-zinc alloy layer. This layer is the result of the action of the molten zinc on the solid iron. It can be avoided by diminishing the dipping time and the dipping temperature.—Page 1528.

* * *

Great resistance to "age brittleness" makes 3 per cent nickel steel an excellent boiler material for locomotives, but engineer doubts its suitability for higher superheats. Says it is disappointingly weak at more elevated temperatures.—Page 1527.

* * *

X-ray is used to check welds on gun carriages. Welded construction eliminates cumbersome and heavy cast steel carriages. Reliability of the welds can be determined, says army engineer, only by X-ray examination.—Page 1522.

* * *

Cuts cost of guns by casting centrifugally. Molten molybdenum steel is poured into a rapidly revolving mold. The casting is placed in a metal jacket and the bore expanded hydraulically. Guns are stronger than forged guns, cost is less, and manufacturing time is cut two-thirds.—Page 1521.

* * *

Slings of spun yarn are useful for handling boilers. Slippage is prevented, especially where the sling passes over rivet heads.—Page 1520.

* * *

No cost system in 85 per cent of American gray iron foundries, says cost authority. Standard cost system is submitted in order to avoid the confusion which attends the present haphazard practice.—Page 1535.

* * *

Steel casting defects due to sand in 95 per cent of cases investigated. In only 5 per cent of the cases are troubles due to the metal.—Page 1535.

Business will get no worse, says economist. Bottom reached; but decided improvement may not come before autumn. Will come first in those industries not dependent on foreign trade, which is seriously hampered by restrictive policies.—Page 1554.

* * *

Sand reclamation failures are due to lack of proper attention to condition of sand when it goes to the reclaiming unit, and to lack of suitable equipment for removing detrimental materials.—Page 1535.

* * *

The finer the sand, the better the casting, says metallurgist. A mold with a hard face and with increasing permeability a way from the chilled mold surface is what is desired. Fines are often destroyed binders and not fine grains of sand.—Page 1524.

* * *

A dangerous weakness in mergers is effect on morale of executives in merged companies. Losing their sense of responsibility, they become less efficient producers.—Page 1545.

* * *

Don't penalize the department head for poor results in departments other than his own. The incentive plan should be so arranged that bonuses are made or lost according to results within the power of each key man.—Page 1545.

* * *

Lower steel prices may result from relatively heavy output, Dr. Haney says. Output is greater than demand warrants and prices are likely to drift lower.—Page 1549.

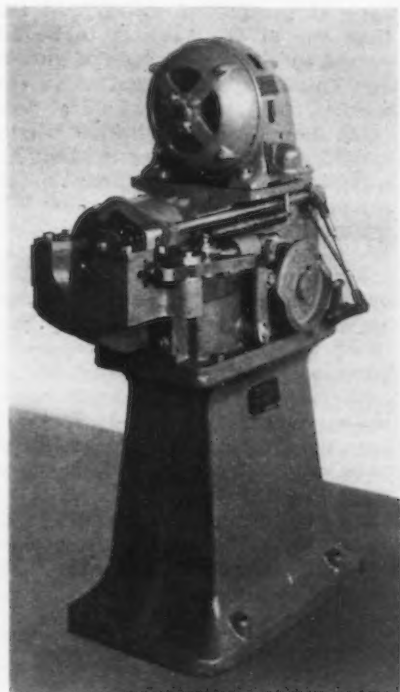
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Keep your eye on the big factors in your costs and forget the little ones. Some items scarcely warrant the attention paid to them. A budget, wisely administered, will point out where appreciable savings can be made.—Page 1538.

Bolt and Stud Pointer for 1-In. Stock

A SEMI-AUTOMATIC bolt, stud and rod pointer having unique features is being offered by the Kent Machine Co., Cuyahoga Falls, Ohio. The pointing head moves forward and back a predetermined number of times a minute.

This machine is built in two types. One type has an arrangement for



Although Designed for Pointing, the Machine Can Be Adapted for End Drilling, Hollow Milling and Other Operations

holding by the head the bolt to be pointed, while the other type has a double-jaw gripping attachment, where round-head bolts, studs or rods are to be pointed.

The pointing-head spindle is driven by silent chain in the motor-driven machines and by a pulley on the spindle from a countershaft when the machine is furnished in belt drive. The reciprocating action of the cutter head is obtained by a cam driven through gearing from the cutter spindle.

All of this gearing and cam mechanism is contained within the body of the machine. Outside of the body is a set of change gears by which the number of reciprocations of the cutter head may be controlled. Gears for obtaining 25 to 60 points a minute are furnished with the machine and other gears may be secured for fewer or greater reciprocations, if conditions warrant these extremes.

A socket-holding carrier is supplied when the bolts are to be held by the head for the pointing operation. This carrier has interchangeable sockets for the different diameters of bolt heads. The carrier with socket is adjustable for different lengths of bolts.

The gripping attachment for studs and similar parts is cam-actuated,

with the work held between two grip jaws. These grip jaws can be furnished for different diameters of work. This mechanism is also provided with a swinging stop for locating the end of the work with relation to the advanced position of the cutter head. The head carrying the pointing tools is short and very substantial in construction.

Two square tools, rigidly clamped in place, are used. These tools are easily made and quickly ground. Any type of point can be obtained.

While this machine is designed especially for pointing, it can be adapted to end drilling, shouldering, hollow milling, etc. It will point all bolts up to and including 1 in. diameter, of any commercial length. The machine is built in bench or pedestal type and in belt or motor drive.

Combination Drilling and Tapping Machine

A COMBINATION drilling and tapping machine employing a four-spindle head has been brought out by the Landau Machine & Drill Press Co., 200 Broadway, New York.

The four-spindle head is made up of two members. The upper member is secured to the drill stand, while the lower member carrying the four spindles can be indexed quickly to bring any spindle into operating position. Each spindle is independently adjustable for depth of drilling or tapping. A centering device prevents operation of the feed lever until the desired spindle is in proper alignment with the main drive spindle. The



The Lower Part of the Four-Spindle Head Can Be Indexed to Bring Any Spindle Into Operating Position

latter spindle is arranged to release automatically as each drilling or tapping spindle completes its operation.

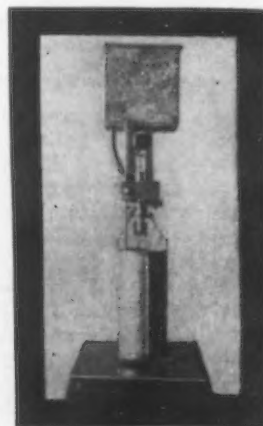
Two spindles can be used for tapping and two for drilling, or three for drilling and one for tapping. A series of operations may be completed without removing the work from the table or the machine can be used as a single-spindle drill press, with the remaining spindles idle.

The tapping spindles are sensitive and are arranged to reverse at fast rate. Speed changes can be made quickly and without stopping the machine. The upper driving pulley is mounted on a ball-bearing eccentric shaft and adjustment is provided for taking up belt slack.

Specifications include chuck capacity, 1/4 in.; table size 9 x 13 in.; table adjustment, 7 in.; travel of main drive spindle, 3 in.; travel of drilling spindle, 2 in.; and travel of tapping spindle, 1 in. Drilling speeds are 650, 1100 and 1800 r.p.m., and tapping speeds, 110, 190 and 310 r.p.m. The machine, furnished with a 1/4-hp. motor, weighs 300 lb.

Machine for Testing Strength of Cores

A SMALL machine has been developed by the Lindsay-McMillan Co., Milwaukee, for testing the strength of cores. It was designed



for the express purpose of obtaining two tensile strength tests on one test bar, eliminating the possibility of the core breaking at its weakest point and giving false results. It was developed in the core oil research division of the company's laboratory and is known as the new Delco tensile strength core-testing machine. The core used is rammed on a Michigan University core rammer, developed by Prof. H. Campbell.

Boston Bridge Works, Inc., Cambridge, Mass., has been awarded a contract to wreck the train shed at South Station, Boston. Estimates of the amount of steel scrap involved vary from 3000 to 3900 tons. The scrap has been purchased by the Roxbury Iron & Metal Co.

Form Alloy Steel Castings Division



Will Cover Heat and
Corrosion Resistance
Field—Business Out-
look Fair

REASSURING reports of the favorable position in a business way of the steel foundries of the country featured a general meeting of the Steel Founders Society of America held in Cleveland last week in conjunction with the convention and exhibition in that city of the American Foundrymen's Association. Individual company operations indicated a general average of approximately 76 per cent.

An alloy castings division, devoted to castings for heat and corrosion resistance applications, was organized, so that the society now has three divisions. One of these is the small castings division, employing the electric process, and the second is the large castings division, covering products made in the open-hearth furnace.

Among the addresses of meeting was one on "Firm Bidding" by W. W. Nichols, assistant to the president of the Allis Chalmers Mfg. Co., and one on steel foundry budgetary control by A. K. Reading, Zimmermann Steel Co., Bettendorf, Iowa.

Operations at 76 Per Cent

In respect to the business outlook, the consensus of the individual company reports was that the prospects are very fair and that inquiries, while down from the situation obtaining 30 and 60 days ago, are holding steady. Labor conditions were named as good, with a surplus in the Middle West. Sentiment was general that the second quarter would hold up to the first, if not show some improvement over it, and better business seemed to be expected in the last half of the year. Operations at the moment were put at 76 per cent of capacity, as stated, shipments at 79 per cent and bookings at 76 per cent.

The general sessions were conducted by John E. McCauley, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., president of the society. Reports were made by the committees on cost, W. J. Corbett, Fort Pitt Steel Castings Co., McKeesport, Pa., chairman, on industrial research, Harold S. Falk, Falk Corporation, Milwaukee, chairman, and on technical research, R. J. Doty, Reading Steel Casting Co., Reading, Pa., chairman. The work of the cost committee indicated that an unusually comprehensive plan is in progress and that a system is promised that excels anything yet attempted in all the work of this nature that has been done in the past. The report was one of definite progress.

Granville P. Rogers, managing director of the society, made a stirring report, recounting the remarkable achievements of the society in the short time since its reorganization. Two new members were announced, following some 19 which had joined since last fall: Hartford Electric Steel Corporation and the Electric Steel Casting Co., Indianapolis. Representatives of the American Steel Foundries and the General Casting

Resolution on Firm Bidding Adopted by Machinery Builders Society

WHEREAS the practice of manipulating bids as between buyers and sellers reduces a sound business negotiation to the hazards of common gambling; invites confidential information for the purpose of procuring price advantage; wastes time and energy and encourages price cutting at the expense of fair dealing and honest values—all detrimental to the public interest; and

WHEREAS FIRM BIDDING* precludes any suggestion of price fixing by the seller or any prospect of price revision in the mind of the buyer, and will logically result in more accurate cost estimates, improved quality of product, increased plant efficiency, maintenance of wages and conditions of work at a satisfactory level, with lower prices to the consumer—highly legitimate considerations in the public interest; now, therefore, be it

RESOLVED that the Machinery Builders Society shall and it hereby does indorse the principle of FIRM BIDDING; further

RESOLVED that the members of the Machinery Builders Society will instruct their purchasing agents to receive firm bids in the conduct of their departments, and to use their influence in securing, through their associations and otherwise, the approval of this principle by purchasing agents generally; and further

RESOLVED that this resolution be presented to the National Association of Purchasing Agents urging the latter to accept the principle and to further its practice.

*Defined as: The submission of a price accurately determined with reference to cost, to remain unchanged unless a change in buyer's specifications warrants a different quotation.

Co. took part in the discussions and indicated an intention to join in the one case and at least to subscribe to the principles and practices of the society in the other. Special emphasis was laid on the midsummer convention of the society to be held at the Greenbrier, White Sulphur Springs, W. Va., June 26, 27 and 28.

The new alloys castings division elected Thomas R. Heyward, Jr., Duraloy Co., Pittsburgh, its chairman. The division will hold a meeting at the time of the general meeting in June of the parent society. At that time one of the subjects to be discussed will be the question of unusual and unreasonable guarantees in connection with the sale of alloy products, and a broad invitation will be extended to all producers of heat and corrosion resisting castings to be present.

"Quote Final Figures First"

Mr. Nichols' message was "to make one bid and stand by it." He concluded his address with a reading of a resolution which had been adopted by the Machinery Builders Society on the matter of firm bidding and this resolution is here reproduced. In correspondence over purchases, a sticker or pasteur is attached to letters, stating that "bidders will receive fair and equal treatment." The sticker, which is printed in red and blue, with the lettering in white, emphasizes also: "Quote final figures first."

Fabricated Orders Drop Further in April

WASHINGTON, May 20.—Orders for fabricated structural steel in April were 179,731 tons, the lowest since last November. This was 59 per cent of the 305,905 tons capacity of companies reporting to the Department of Commerce, compared with 62 per cent of a total capacity of 335,231 tons of companies reporting in March.

Computed bookings in April were 236,000 tons, compared with 248,000 tons in March, 280,000 tons in February and 252,000 tons in January. Computed shipments totaled 308,000 tons in April or 77 per cent of the capacity of reporting companies, compared with 280,000 tons in March, or 70 per cent.

Computed bookings in the first four months are 1,016,000 tons compared with 1,232,000 tons in the same period of 1929. Computed shipments total 1,128,000 tons, compared with 1,101,100 tons in the same period last year.

Cooper-Bessemer Corporation, Mount Vernon, Ohio, manufacturer of internal combustion engines, has arranged to finance Diesel and gas engine sales on a time payment plan.

Commonwealth Brass Corporation, Detroit, has opened a Chicago district sales office at 205 West Wacker Drive, in charge of C. A. Bierma.

Bottom of Recession Reached

Definite Recovery Not Yet in Evidence—Prosperity Will
Return in Largest Measure to Businesses Least
Dependent on Foreign Trade

BY DR. CHARLES O. HARDY

THE business records of the past month exhibit more stability than do those of the months immediately preceding, and point to the conclusion that the bottom of the current depression has been reached, but give scant indication of the probable time when definite recovery will be in evidence.

Most business indexes show April better than March, with the early May reports not quite so favorable. The Conference of Statisticians in Industry reports general agreement among its members that the low point of the current movement was reached in March. The Annalist Index of Business Activity (preliminary figure) showed a rise of three points from March to April, bringing the index back nearly to the level reached in the sharp recovery of January. Seven of the eight items reported showed a gain. Building contracts, which are not included in this index, also show an increase. Were it not for the very poor showing of residence contracts, this item would make a decidedly better showing than last year.

Prices of commodities of bonds, and of stocks have been weak; open market commercial rates have declined, and stocks of most raw and semi-finished goods have increased. There are widespread reports of unemployment, though the increase over preceding years does not seem as great as the current level of production would forecast; the American Federation of Labor reports an average of 21 per cent of members unemployed for the first quarter, as compared with about 15 per cent last year and 18 per cent in 1928.

No New Weak Spots

ON the whole, the record of the last five weeks is only a little better than neutral. No new weak spots have appeared, but there is no line of industry that has yet exhibited marked power of recuperation.

Most market commentators believe that this stalemate will last through the summer, with a decided improvement scheduled for the autumn. This prediction is based on the theory that a revival is not likely to start in the period of normal summer dullness. Precedent indicates, however, that seasonal tendencies do not necessarily dominate cyclical changes. In the

Record of last five weeks only
a little better than neutral.

* * *

Stalemate will not necessarily
last through the summer
since seasonal tendencies
do not dominate cyclical
changes.

* * *

Performances of steel trade
and automobile industry
are encouraging, and sec-
ondary stock market reac-
tion did not have disastrous
effect on business sentiment.

* * *

Weakness of bond market is
attributable to uncertainty
among buyers as to whether
bond prices are high or low.

* * *

Raw material countries are
confronted with glutted
markets because of mis-
taken protective and restric-
tive policies.

* * *

United States, being more
nearly self-contained than
other industrial countries,
will be correspondingly less
affected by world-wide trade
difficulties.

recession of 1924, after a rally in February comparable with that of the present year, and renewed decline in the spring, a definite and permanent improvement began in the early summer.

Steel Trade Steady, Stock Market Resilient

ASIDE from the small gains in productive activity, which in most cases are not very significant, the most favorable factors are the strength and steadiness of the steel trade; the relationship between production and sales in the automobile industry, and the fact that the stock market has been able to adjust an over-extended position without creating a wave of hysteria over the effects on consumer buying power.

The most unfavorable factor for the immediate future is the lack of sustained strength in the bond market; for the longer run the export markets offer more serious difficulties. The wholesale price situation, and the condition of the short term credit market are results of the current state of demand, and will change as demand changes; they will have little independent significance in determining the trend of business.

Taking up the favorable factors first, we note that in terms of capacity the output of iron and steel, though poor by the standards of 1929, has not for any month of the current year fallen below the average record of the entire year 1927, and is running far better than in 1924. Steel enters into so wide a range of industrial products that this record seems impossible to reconcile with current impressions of the magnitude of the depression.

The explanation seems to be first that the seriousness of the depression, as compared with others, is generally overestimated because the stock market crash made everyone alert for signs of it; and second that the depression centers largely in textiles and in that branch of construction which makes the smallest demands on the steel industry, namely, residence building. Moreover, the railroads have been buying much more heavily of steel products than would normally be expected on the basis of their reduced earnings. Some falling off in this class of business is to be anticipated, and must be compensated for by an expansion of demand from the automobile industry if steel is to make as good a showing for the year as the record of the first four months would forecast.

Gain in Automobile Sales Probable

SUCH a gain from the automobile industry seems probable on the basis of the sales of new cars to consumers. In the five months ended May 1, the number of passenger automobiles produced was almost exactly equal to the sum of domestic registrations and exports.

Considering that in winter the industry regularly accumulates stocks for the heavy selling season, this is equivalent to a very material curtailment of inventory; indeed it has been

figured by Mr. Ellsworth, of the staff of the *Annalist*, that the stocks of cars in dealers' and manufacturers' hands are probably lighter, when allowance is made for seasonal conditions, than at any time since 1927.

Business Weathers Secondary Stock Reaction

IN the last preceding article of this series the writer expressed some apprehension lest business might be about to suffer another shock from the psychological influence of a renewed wave of stock market liquidation. The liquidation came promptly enough, stock prices declining faster than they have at any time since 1926, except in the last three months of 1929, but there has been no such adverse effect on business sentiment as was feared. The general reaction, in contrast to that of last fall, seems to be that the decline was merely a normal readjustment of a price structure that was out of line with present conditions, and does not forecast worse conditions to come.

The bond market has been weak. Bonds were expected to rise after the stock market collapsed last fall, and they did show a considerable gain during the winter, though no more than the stock market showed over the same period. However, bond prices turned downward in March, some weeks before the break in stock prices, and they have shown no rallying power since. This circumstance is hindering the financing of public utility and building projects, precisely the types of enterprise that are most independent of the immediate business situation and could contribute most to recovery from depression.

The difficulty is not primarily that

bond prices are too low to permit of profitable financing, nor is it a lack of funds for investment. The short term money market has a plethora of funds. The trouble is that nobody knows whether bond prices are high or low. By the standards of 1923 and 1924 bond yields are high; by those of 1929 they are low. The uncertainty forces savings into the short term money market, where the investor accepts a very low yield on time deposits or open market paper while waiting to see which way the market is going. The situation is not likely to clear up till the forthcoming reparation financing is out of the way.

Export Outlook no Better

THE prospect for foreign trade, as has been noted in previous articles in this series, is bad, and it is getting no better. In a number of important markets for our exports large communities are dependent for their prosperity on one or two important products, usually mineral or vegetable raw materials. Costs of production in a number of these lines have been lowered greatly since the war, partly because of heavy investments made under the stimulus of war-time prices and partly because of scientific progress. Almost everywhere the effort has been not to pass these gains on to the consumer, or write off the loss if there was obvious over-investment, but to peg prices at levels so high that there is no demand for potential production, and then to hold production down to the amount that can be sold profitably. In a few cases the effort has been financially profitable; in most cases the result has been to stimulate still further investment and make restriction of production more and more difficult.

Partly because of mistaken protective and restrictive policies; partly because of decreases in costs in fields where demand does not respond to falling prices, and partly because of the slackening of consumption by industry during the past six months, a very large fraction of the world finds itself confronted with glutted markets for its principal products, excessive stocks, and no chance of moving them except at distress prices. Political disturbances in India and China and the collapse of the silver market accentuate the difficulty. From these conditions no early relief seems likely.

Consequently it seems safe to predict that prosperity will return in largest measure to those lines of business least dependent on foreign markets. The situation is likely to parallel that which appeared during the revival of 1922-23, when building, highway construction, retail distribution, railroads and public utilities did best, while shipping, staple lines of agriculture, and such manufactures as looked most to foreign markets lagged behind. In that case the seat of trouble was in Europe; in this case it is in the less developed portions of the world; but their difficulties are bound to react on Europe and in less degree on us.

The United States is more nearly self-contained than is any other large industrial unit and we may expect that it will be correspondingly less affected by the world-wide disturbance; already it appears that the depression is more severe in England and in Germany than here, and still more so in the Orient, in South Africa, and in a large part of South America.

"Armco" Acquires Sheffield Corporation

Combination Will Give Middletown, Ohio, Company Greater Diversification of Products

GEORGE M. VERITY, chairman, and Charles R. Hook, president, American Rolling Mill Co., and W. L. Allen, president, Sheffield Steel Corporation, announce that the directors of the American Rolling Mill Company and the Sheffield Steel Corporation have concluded negotiations for combining the interests of the two companies.

When effected, the combination will add to the products of the American Rolling Mill Co. merchant bars, billet and rail steel reinforcing bars, bolts, nuts, rivets, spikes, tie plates, oil field and railroad forgings and bar iron, barbed wire and nails, and will give to the American Rolling Mill Co. immediate production at Kansas City of blue annealed sheets, Sheffield having two blue annealed jobbing mills with a range of sizes up to 72 in. in width.

The announcement of the consoli-

dation called attention to the fact that it involves a new policy of diversification on the part of the American Rolling Mill Co., which heretofore has confined its manufacturing facilities to sheets and strip steel.

The combined companies will have plants at Middletown, Zanesville and Columbus, Ohio; Ashland, Ky.; Butler, Pa.; Kansas City, Mo., and Oklahoma City, Okla.

It is understood that the Sheffield company will retain its separate identity. W. L. Allen, its president, probably will become a member of the board of directors of the American Rolling Mill Co.

The Sheffield company was formed in 1925 as a Delaware corporation to acquire the Kansas Bolt & Nut Co., organized in 1888. In addition to the two blue annealed sheet mills, the company operates four open-hearth

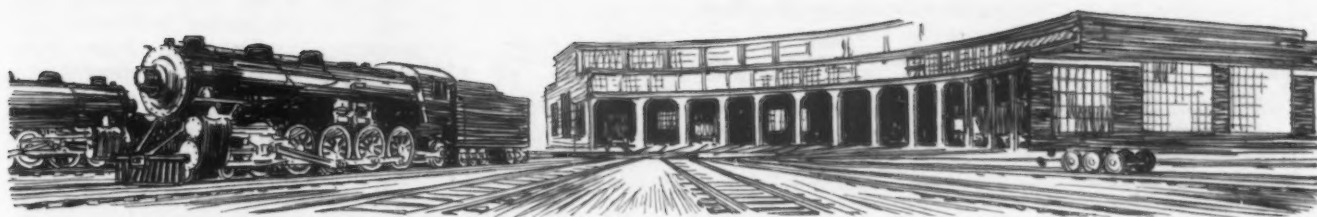
furnaces, a bar iron and rail rerolling mill, bolt, nut and forging works, a wire mill, bar and rod mill and a blooming mill. Capacity of the plants is in excess of 200,000 tons annually.

Capitalization consists of 200,000 shares of no par common stock, of which 185,228 are outstanding; \$2,500,000 of 7 per cent cumulative preferred stock, \$100 par, all of which is outstanding, and \$3,500,000 of 5½ per cent first mortgage gold bonds.

Net earnings of the Sheffield company in 1929 were \$1,758,358, as against \$1,466,283 the previous year. Earnings per common share were equal to \$5.62 in 1929.

THE IRON AGE of May 2, 1929, p. 1206, carried a description of the new billet, rod and wire mills of the Sheffield Steel Corporation.

American Steel Foundries shows a net profit for the first quarter of 1930 of \$1,019,460 after depreciation and Federal taxes, equivalent to 91c. a common share. This compares with \$1.21 a common share earned in the first quarter of 1929.



New Freight Rates on Steel in Effect

Mileage Scale Ordered by Interstate Commerce Commission Became Operative
May 20—Influence on Marketing Awaits Thorough Trial

MARKETING of manufactured iron and steel went on a new basis on Tuesday, May 20, when readjusted freight rates throughout Official Classification territory became operative. The effect on competition and distribution can be known only after the new tariffs have been applied for a reasonable time.

The new rate structure grew out of the decision of the Interstate Commerce Commission under the Hoch-Smith resolution. It is the most sweeping of the kind ever made as it affects iron and steel rates.

The task of preparing the new schedules was so great that their effective date was postponed several times in order to give the carriers an opportunity to complete them. Even then it was necessary for the commission, in an order last week, to permit the carriers to file schedules upon one day's notice. This action of the commission made it evident that it had concluded definitely not to grant requests from both railroads and shippers for further postponement of the effective date.

The new rates are built on two mileage scales. A separate scale for the New England territory carries a differential of 10 per cent above that

Pittsburgh and Chicago Rates to
Western Consuming Points

To	From Chicago		From Pittsburgh	
	Old	New	Old	New
Decatur, Ill.	18.0	20.0	36.0	36.0
Jacksonville, Ill.	20.0	22.5	40.5	38.0
LaSalle, Ill.	13.0	16.0	38.5	37.0
Moline, Ill.	17.0	20.0	43.0	39.0
Peoria, Ill.	16.5	19.0	36.0	37.0
Quincy, Ill.	20.0	25.0	43.0	41.0
Rockford, Ill.	12.0	14.5	38.5	37.0
Springfield, Ill.	18.0	21.0	38.0	37.0
Evansville, Ind.	23.5	26.0	37.0	36.0
Fort Wayne, Ind.	16.5	19.0	26.0	27.0
Indianapolis	18.0	21.0	29.0	30.0
Kokomo, Ind.	16.5	18.5	29.0	30.0
Michigan City, Ind.	8.0	11.5	31.0	33.0
South Bend, Ind.	12.5	13.0	30.0	31.0
Terre Haute, Ind.	18.0	20.5	34.0	34.0
Vincennes, Ind.	22.0	23.5	35.0	35.0
Detroit	27.5	25.5	29.0	27.0
Grand Rapids, Mich.	25.5	21.0	33.0	32.0
Holland, Mich.	23.5	19.5	34.5	34.0
Muskegon, Mich.	26.0	21.0	35.0	34.0
Saginaw, Mich.	29.5	25.0	32.5	31.0
Clinton, Iowa	17.0	18.5	43.0	39.0
Dubuque, Iowa	17.0	20.5	43.0	40.0
Keokuk, Iowa	20.0	24.0	43.0	41.0
St. Louis	22.0	25.5	40.5	39.0
Cincinnati, Ohio	28.0	25.5	27.0	27.0
Hamilton, Ohio	27.5	25.0	27.0	26.0
Toledo, Ohio	26.5	23.5	26.0	23.5
Beloit, Wis.	12.0	15.5	44.0	37.0
Madison, Wis.	14.0	18.0	46.0	38.0
Milwaukee	9.5	14.5	37.0	37.0

country. Under the recent structure both fifth class and commodity rates applied to iron and steel shipments.

The decision met with protests from all sections of the affected territory, as well as from the railroads. These protests made clear the diverse views within the industry as to the competitive situation that would arise from the new method of making rates. One source of objection was that, while there would be both increases and decreases, higher rates would generally prevail for short hauls under which the vast bulk of steel moves. It was maintained that elimination of the Pittsburgh-plus system had a tendency, especially in some lines, to "localize" the industry and that the new rate structure would emphasize this trend. Another outstanding objection was that the decision would break up the rate relationship.

Large Increases Result From New Grouping Arrangements

Among the latest and most vigorous requests for further suspension of the rates and reopening of the case were those developing from the grouping arrangement. Particularly pointed was this request coming from Indiana consuming points. It was declared

applying to the remainder of Official Classification territory. In this territory lies approximately 90 per cent of the steel-making capacity of the

Comparison of Old and New Freight Rates on Manufactured Iron and Steel Articles
From Principal Producing Points to New England

(In cents per 100 lb.)

To	From Pittsburgh		From Buffalo		From Cleveland		From Coatesville		From Bethlehem		From Sparrows Pt.	
	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old
Bridgeport, Conn.	37	36.5	32	33	39	43	22	25.5	20.5	25.5	25.5	25.5
Hartford	37	36.5	32	33	38	43	24.5	25.5	23	25.5	28	25.5
New Britain	37	36.5	32	33	38	43	24.5	25.5	23	25.5	28	25.5
New Haven	36	36.5	32	33	38	43	23	25.5	21.5	25.5	26.5	25.5
Waterbury	36	36.5	31	33	38	43	23.5	25.5	24	25.5	27	25.5
Boston	40	36.5	34	33	40	43	30	25.5	28.5	25.5	33	25.5
Springfield	38	36.5	31	33	38	43	26	25.5	24.5	25.5	29	25.5
Worcester	39	36.5	33	33	39	43	28	25.5	26.5	25.5	31	25.5
Portland, Me.	43	36.5	37	33	42	43	33	25.5	33	25.5	37	25.5
Concord, N. H.	40	36.5	34	33	40	43	32	25.5	30	25.5	35	25.5
Portsmouth	41	36.5	36	33	41	43	32	25.5	31	25.5	35	25.5
Providence, R. I.	40	36.5	35	33	40	43	28.5	25.5	27	25.5	32	25.5
Burlington, Vt.	39	36.5	32	33	38	43	34	25.5	29	25.5	35	25.5

**New and Old Rates From Eastern Basing Points to
Important Centers in the East**

To	From Bethlehem		From Coatesville		From Buffalo		From Johnstown	
	New	Old	New	Old	New	Old	New	Old
New York.....	15.50	14.50	18	17.50	31	32	29	32.50
Philadelphia.....	12	13	10.50	10	31	32	25.50	30.50
Baltimore.....	19.50	19	15	14.50	31	32	24.50	29.50

(In cents per 100 lb.)

that the new grouping starts from Chicago proper instead of following past practices under commission authority to fix the grouping on an average distance basis. Had this latter policy been adopted, it was maintained, the railroads would have grouped the average distance from the 10 or 12 origin points in the Chicago district. The method adopted, it was held, will result in unduly increased rates.

Protest also was made regarding the adjustment between the Chicago and Milwaukee districts as well as the adjustment on steel wire rates from Waukegan, Ill., to Kenosha, Wis. Border points especially along upper Mississippi River crossings, not included in the rate structure, contended that the break in rates adversely affected consumers at destinations in Iowa and other points west of the Mississippi River.

Illustrated Lecture on Tungsten Carbide

**New York Steel Treathers Listen to an Authority and Elect
New Officers**

INCREASING applications of cemented tungsten-carbide tools were well set forth at the May meeting of the New York chapter, American Society for Steel Treating, in an address on "Tungsten Carbide Cutting Tools" by Owen K. Parmiter, chief metallurgist, Firth-Sterling Steel Co., McKeesport, Pa., Monday evening, May 12.

Preceding the address a short business session was held, dealing with the progress made during 1929 in the affairs of the chapter and showing it to be in excellent condition as to finances and activities.

A letter from E. F. Cone, THE IRON AGE, incoming chairman of the chapter, was read, expressing regret for his enforced absence, due to the necessity of attending the Cleveland convention of the American Foundrymen's Association, and assuring his associates of his continuing interest and his purpose aggressively to carry on the aims of the society in general and particularly those of the local chapter. Mr. Cone was elected chairman and J. J. Crowe, Air Reduction Co., New York, vice-chairman for the next year.

Touching the salient features of cemented tungsten carbide, Mr. Parmiter spoke of the compounding of the material—the varying quantities of carbon, tungsten and cobalt used to obtain different structures and varying degrees of hardness and toughness—and illustrated his remarks with lantern slides.

Cobalt Determines Toughness

Pointing out that the material when finally sintered is very hard and brittle, he said that the proportion of cobalt determines the toughness of offset brittleness; the amount, when

small, gives a close-grained structure in which the hard tungsten carbide particles are closely compacted, whereas with a larger amount there is less hardness. The tough nature of cobalt is the reason for its use to bond the tungsten-carbide grains into a workable mass. To obtain free cutting, when a material being machined is of comparatively low tensile strength, low content of cobalt is recommended, since it gives a harder, sharper and more lasting cutting edge. With hard materials, more bond is needed to firmly hold the particles and prevent them from being torn out.

In any event successful experience with these tools indicates ability to cut materials at much greater speed than heretofore, and will in all probability lead to the solution of the problem of fusing the component parts into a hard integral unit that can be formed into desired shapes similar to those of steel tools.

Ratio of Different Mixtures Described

Slides used during the address showed charts giving the ratios of different mixes of the compound, tensile and compressive strengths, and the figures indicated that, while the tensile strength was somewhat below that of high alloy steels, the strength exceeded any cutting stress that might be placed upon it and was practically incompressible.

The ball mills for crushing the tungsten carbide and for thoroughly coating the particles with cobalt were shown, as were also the hydrogen furnaces for preparing the compound, it being explained that the preparation and the final sintering must be done in a hydrogen atmosphere, as the introduction of any oxygen would

be deleterious in effect. A hydraulic press and graphite molds were shown. Graphite is the only material that will stand the intense heat during the sintering period, high heat being necessary to completely cement the tungsten carbide with the cobalt. The fusing point of tungsten is so high as to be unaffected in hardness under the sintering temperature.

The slides showing tool shapes and bit applications proved interesting, particularly a chip breaker tool, which is formed to overcome the annoyance of long chips or curls coming from the work at high speed and the need for raking them out of the way.

A slide depicting tool grinding-wheel data of several makers, which agreed in general sizes as to grit and bond, as well as suitable grain for honing and lapping, brought out the fact that tools could be ground either wet or dry, only the usual precaution applying to steel tools being observed. There is the added advantage that cemented tungsten carbide tools, being inherently hard and hence without temper, can be ground without fear of drawing the temper of a cutting edge.

Chicago Rates to Nearby Points Suspended

WASHINGTON, May 20.—Schedules revising rates on iron and steel products from Chicago to nearby points in Illinois and Indiana were suspended today by the Interstate Commerce Commission until December 20. These tariffs were a part of the schedules which revise rates on iron and steel throughout Official Classification territory. Only those applying to nearby points from Chicago were suspended. The suspension was ordered because, under the new mileage scale, the rates from Chicago began with a minimum charge of 10c. a 100 lb. The commission scale sets up a minimum of 6c., beginning with the points of origin. The Chicago schedules were the object of strong protest from steel manufacturers and consumers at points nearby in Illinois.

American Car & Foundry to Become Fabricator

The American Car & Foundry Co. has adopted a new policy of diversification at its Buffalo plant, having decided to engage in the fabrication of structural steel for bridges and buildings. The Buffalo plant has done this type of work for some time for one of the railroads. Only the Buffalo plant is thus far affected by this new policy.

Morgan Engineering Co., Alliance, Ohio, has completed a 46-in. 2 high universal plate mill for the A. M. Byers Co., and kept open house May 21 at its plant for the inspection of this mill.

Sheet Metal Distributors Reorganize

Metal Branch of National Hardware Association Becomes an Affiliated Entity with Own Officers

AFTER nineteen years of successful operation, the Metal Branch of the National Hardware Association was reorganized as the National Association of Sheet Metal Distributors, the new plan of organization having been adopted at a meeting in Niagara Falls, Ont., on May 16 and 17.

The new association, while continuing to function with the cooperation and assistance of the parent organization, will elect its own president, vice-president and executive committee. The secretary and assistant secretary of the National Hardware Association will serve the Sheet Metal Distributors in the same capacity and the by-laws remain unchanged. Members shall also receive the benefits of the cost studies and other services of the national office, and enjoy other advantages heretofore available.

To succeed the chairman appointed annually for the Metal Branch by the president of the National Hardware Association, a president and vice-president will be elected annually by the new group. Of the six members of the executive committee, two will be elected each year for three-year terms. The president and vice-president shall also serve as ex-officio members of the committee.

Low Point in Business Reached

In a discussion of current business conditions, which was led by R. B. Flershem, vice-president, Marine Trust Co., Buffalo, and formerly vice-president of the American Radiator Co., members of the association expressed the opinion that, while business in their industry has fallen 20 to 25 per cent behind last year, the low point apparently has been reached. Mr. Flershem, in a general summation of the statistical barometers upon which business forecasting is predicated, indicated that currently business sentiment is somewhat worse than actual conditions. He pointed out that the country's credit condition has been generally liquidated in the last few months, and that the business index, which has been declining in various degrees since last July, has not moved further downward in the last two months. General conditions point to an upward turn, and although this may not occur immediately, it was Mr. Flershem's opinion that improvement must certainly come in the late summer or early fall. He stated that business during the present depression has not reached the low levels of 1924, and if the abnormal volume of 1929 is forgotten, comparisons with previous years are not entirely unfavorable.

Members of the association were particularly interested in Mr. Flershem's analysis of the building industry, based largely on his recent experience with the American Radiator Co. He pointed out that, accord-

ing to the statistical indices of this company, residential building operations must almost certainly improve during July, largely because of cheap money and accumulating shortage of housing facilities.

A. P. Lamneck, Columbus, Ohio, expressed the opinion that boom periods in industry of the kind witnessed in 1929 may not be expected to occur so frequently in the future, because of general overproduction, the elimination of labor by means of machinery and the unstabilized condition of the farming industry.

Profits Again Low

Overhead expenses by association members were again high in 1929, according to a report by George A. Fernley, secretary of the association, which was based upon the experience of nine concerns. The average total expense of these companies was 21.12 per cent of sales, this figure having included administration, warehousing and handling, selling expense, fixed charges, interest at 6 per cent on capital surplus, and losses from bad debts. The average turnover for the nine companies reported was 4.55 per cent, with individual figures ranging from 3.5 per cent to 6.93 per cent. Three companies reported a deficit for the year, while the average net profit for the companies included was 1.01 per cent. The report provoked considerable discussion, and its analysis indicated that sheet metal distributors must be particularly careful with their costs in the future if the industry is to survive.

One method by which business may be improved is by the addition of specialties to the lines now carried. But it was pointed out that the average jobber now carries so many items that he has not the time to force the sale of specialties, and that manufacturers' representatives are developing this business in a number of territories. Jobbers reported that sales of electric tools have been generally profitable where this line has been introduced, although in some territories difficulty with collections has been experienced. Warm air furnaces and fittings have also proved a profitable line in some instances. F. O. Schoedinger, Columbus, Ohio, chairman of the Metal Branch, brought this discussion to a close with a plea for further diversification of products, which was generally supported by the members.

Pool Cars Offer Menace

Discussion of collective buying of pool cars, led by George Johnson, McClure-Johnson Co., Pittsburgh, indicated that this method of buying is uneconomical and will likely die out of its own accord if continued. It was indicated that many mills are using this method of distribution in the South and Southwest, particular-

ly in Texas. David Gaston, Follansbee Brothers Co., Pittsburgh, called attention to the difference between mixed cars, which are made up of a number of items all billed to the same consumer, as compared to pool cars, the contents of which are shipped to a number of consumers in the same territory and billed separately.

Mixed carloads, he believed, would likely continue, as many manufacturers have facilities for their loading, and in some cases can handle this business profitably. He did not feel, however, that sheet manufacturers could handle pool cars profitably because of the added burdens of billing and collecting, and the low prices realized on such business.

The case of a group of sheet metal contractors in a Pennsylvania city was cited as an example of pool car buying, and it was pointed out that many of these contractors paid more for the products which they bought in this way than they would now be required to pay in the open market. Such an example indicated that further ventures in pool car buying would hardly be undertaken by the same people, and thus the practice might die out.

Quantity Differentials Beneficial

The recent introduction of quantity differentials on sheet steel, as well as other steel products sold out of warehouse, was discussed by F. J. McNeive, W. F. Potts, Son & Co., Inc., Philadelphia. Mr. McNeive stated that jobbers in his district had made these differentials effective on individual steel products rather than on aggregate orders, and thus even though a customer might buy 50,000 lb. of steel bars and thus be entitled to the full discounts, the purchase of 500 lb. of galvanized sheets at the same time would not entitle him to a quantity discount. It was stated that in other districts the discounts apply to the total order, but that in both cases a substantial profit to the distributor was the result.

A discussion of the effect of the marginal profit on galvanized roofing upon the volume of sales of this article was led by Robert H. Lyon, Lyon, Conklin & Co., Baltimore. Mr. Lyon was of the opinion that distributors have little opportunity for profit on this product because of the low margin and also because of direct mill competition, or the competition of direct mill shipments through the distributor. Karl Roth, Braden Mfg. Co., Terre Haute, Ind., stated that mills were taking this business at the distributors' cost in his territory, and that the line had practically ceased to be profitable.

Distributors Must Be Salesmen

A challenge to the warehouse industry was made by Thomas D'A. Brophy, vice-president, Revere Copper & Brass Co., Inc., New York, when he stated that his company was considering direct factory distribution of copper products, unless better volume was obtained from jobber sales. Mr. Brophy said that the copper industry was spending large sums in adver-

tising each year, the value of which was entirely lost if proper distribution channels are not clearly defined. The Revere company favors distribution through jobbers if they really do their job right. "Distributors," said Mr. Brophy, "should be the salesmen of the manufacturers and not mere order takers."

Mr. Brophy pointed out that manufacturers of rolled copper products have facilities for very large production and must have business to engage this capacity. It is willing to spend any necessary amount to clear the channel of sales for these products. As an example of the large increase in sales of brass and copper products in recent years, he cited sales of brass pipe, which totaled 1,700,000 lb. in 1920, and had in-

creased to 80,000,000 lb. in 1929. This seemed to offer conclusive proof of the possibility of a large volume of business in a high-priced product, if sales are properly supervised.

Several of the distributors present pointed out the ruinous competition which exists in certain territories in the resale of copper sheets, but this, in Mr. Brophy's opinion, is the problem for distributors to work out among themselves, and not a concern of the manufacturer.

Trade Practice Conference Still Under Consideration

Robert H. Lyon, reporting on the association's trade practice conference committee, indicated that the calling of such a conference was largely up to the individual members. Recently

several associations have had difficulty in obtaining the attitude of the Federal Trade Commission on certain practices existing in the trade, and it was finally decided to postpone indefinitely the calling of such a conference in the sheet steel distributing industry.

Other association business of more than passing interest included what amounted to a vote of confidence to the mills, as a resolution was passed inviting mill representation in the reorganized association. It was also decided, if possible, to hold the next annual meeting of the group at the same place and on adjacent dates to the annual meeting of the American Steel and Heavy Hardware Association, which is holding a meeting this week in Chicago.

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

CHARLES HOWARD MILLETT, for many years identified with the gage and valve industry, and who succeeded his father as president of the Crosby Steam Gage & Valve Co., died suddenly on May 13 at his home in Melrose Highlands, Mass. Mr. Millett, who retired from active business two years ago because of poor health, was born in Malden, Mass., Oct. 3, 1870.

HARRY J. WEST, district sales manager of the Ludlum Steel Co., died suddenly at his home in Auburndale, Mass., on May 12. He was born at Harrisville, N. H., Dec. 14, 1874, but spent most of his youth at Worcester, Mass. At one time he served as vice-president of the Atlas Steel Corporation, and previous to that was associated with the Bethlehem Steel Co.

JOHN E. CHARLES, sales engineer for the Grindle Fuel Equipment Co., Cleveland, died suddenly at his home at Rochester, N. Y., on May 2. Previous to his connection with the Grindle company, he was associated with the Pfaudler Co., then with the Symington Co., and later with the American Radiator Co., at Buffalo, where he was in charge of melting and annealing operations. He was 35 years of age.

GEORGE P. GERLINGER, a pioneer in the electric furnace melting industry, died of apoplexy at his home in West Allis, Milwaukee, on May 14. He was born in Marysville, Kan., in 1871 and went to Milwaukee in 1900. With his brother, William E. Gerlinger, who died in October, he established the Gerlinger Electric Steel Casting Co. in 1906 and was its president until the dissolution of the concern in 1927. They then established the Gerlinger Aluminum & Brass Foundry Co., West Allis.

CARROLL O. HOLMES, vice-president of the United States Steel Products

Co., died suddenly at his home in Plainfield, N. J., on Friday evening, May 16. He was born at Auburn, N. Y., in 1874, and was educated at Williams College, Williamstown, Mass.



C. O. Holmes

After a two-year connection with D. M. Osborne & Co., Auburn, manufacturers of harvesting machinery, and now part of the International Harvester Co., he joined the Carnegie Steel Co. in 1898, and was transferred to the United States Steel Products Co. on its formation in 1903 as manager of the structural steel department. He was elected vice-president in 1928.

GEORGE W. HANNAN, president and general manager of the Washington Tin Plate Co., Washington, Pa., died on May 18, aged 58 years. He began his career in the tin plate industry with the old Jefferson Iron Works, Steubenville, Ohio, and later served as superintendent of the Pope Tin Plate Co. at the same place. When the Pope company was merged with the Weirton Steel Co., he served the latter for a short time, and later became

identified with the Washington company.

ROLAND H. BOUTWELL, president of the Standard Horse Shoe Co., Boston, died May 14, at his home in that city following an illness of more than a year. He was born at Lyndeboro, N. H., May 2, 1853. He was financially interested in the Portland Iron & Steel Co., and for some time was its president.

River Steel Shipments Fell in April

Shipments of steel products on the Ohio River in the Pittsburgh district totaled 66,482 tons during April, as compared with 109,911 tons in March and 105,472 tons in April, 1929. These figures are compiled by the United States Engineer Office, Pittsburgh. On the Monongahela River, April steel shipments amounted to 70,229 tons, as against 111,702 tons in the preceding month and 64,400 tons in April of last year. One thousand tons of steel was moved on the Allegheny River last month, as compared to 100 tons in March and 210 tons in April, 1929.

Canadian Steel Output Down, Pig Iron Up

April production of steel ingots and direct steel castings in Canada totaled 102,681 tons, the lowest amount for any month of the year to date and 13 per cent below the 117,487 tons of March. The decline was mainly in basic open-hearth ingots, which dropped to 92,183 tons from 106,674 tons.

April output of pig iron in Canada showed a slight gain in daily rate. The total for the month was 72,339 tons, compared with 74,582 tons in March, but the daily average was 2411 tons as against 2406 tons in the previous month.

Lincoln Electric Co., Cleveland, has removed its Baltimore office from 432 North Calvert Street to 600 North Calvert Street.

PERSONALS

HAROLD F. KNEEN, since June, 1929, assistant plant superintendent of the Lincoln Electric Co., Cleveland, has been made plant superintendent. He



Harold F. Kneen

was graduated from Cornell University in 1925 as a mechanical engineer and later was superintendent of the Ironton, Ohio, plant of the Indiana Flooring Co. and heat transfer engineer for the Ingersoll-Rand Co. C. J. BOWERS has been appointed production manager of the company's Cleveland plant.

CHARLES V. FRANKLYN, for 20 years associated with the Colonial Steel Co., Pittsburgh, has resigned to become associated with the Braeburn Alloy Steel Corporation, Braeburn, Pa., as district sales manager at St. Louis.

RICHARD L. FOSTER, who has been assistant general manager of sales of the American Steel & Wire Co., with headquarters in New York, has resigned to become general manager of sales of the Wickwire Spencer Steel Corporation and its subsidiaries, the American Wire Fabrics Corporation and the Wickwire Spencer Sales Corporation. Mr. Foster has been connected with the wire business since 1901, when he started as a clerk at Salem, Ohio, for the J. C. Pearson Co., Boston, which manufactured cement coated nails in connection with the plants of the American Steel & Wire Co. In 1921, when the Pearson business was merged with that of the American Steel & Wire Co., Mr. Foster was appointed manager of the merchant sales department at New York, and in 1922 he was made assistant general manager of sales of that company in charge of the Eastern territory.

WILLIAM E. LINDBLOM has resigned as general works manager of the Simmons Co., Kenosha, Wis. He became associated with the company in 1900, and through numerous promotions was finally placed in charge of all plants in the United States and Canada several years ago.

W. H. PEASE, traffic manager of the Bridgeport Brass Co., has been made president of the New England Traffic League.

A. I. BOEGEHOLD, metallurgist, General Motors Corporation, was the guest of the New England Foundrymen's Association at its May meeting in Worcester, Mass., on May 21. He discussed the quality of pig iron and castings as affected by blast furnace practice.

CHARLES E. BEARDSLEY has resigned as president and director of the Beardsley & Wolcott Mfg. Co., Waterbury, Conn., to devote all of his time to the affairs of the Bridgeport Brass Co., of which he is president. R. W. REID, of Providence, R. I., has been made vice-president and general manager of the Waterbury concern. He has been general manager of the Taft-Peirce Mfg. Co., Woonsocket, R. I. EMIL MANNWEILER, vice-president and general manager of the Eastern Malleable Iron Co., Naugatuck, Conn., has been made a director of the Beardsley & Wolcott Mfg. Co.

E. P. GAFFNEY, manager of the machinery steel division of the Crucible Steel Co. of America, New York, will act as manager of the Nitalloy division of that company as a result of the Crucible company's having been licensed by the Nitalloy Corporation, New York, to enter actively into the manufacture of standard types of these special steels.

C. C. COMMONS has been elected first vice-president and assistant secretary of the Foote Brothers Gear & Machine Co., Chicago. F. A. EMMONS has been made vice-president in charge of gear and reducer sales and advertising, H. H. BATES, vice-president in charge of road machinery division, W. A. BARR, vice-president in charge of manufacturing, and W. J. HEINEMAN and W. O. BATES, JR., assistant vice-presidents.

ALLEN B. COFFMAN, formerly Philadelphia district sales manager of the Reliance Electric & Engineering Co., has become identified with the Swind Machinery Co., Philadelphia.

J. FRANK DAVIDSON, who has been associated with the Jeffrey Mfg. Co., Columbus, Ohio, since 1911, has been elected vice-president. He was for-



J. Frank Davidson

merly assistant general manager, following a term as purchasing agent.

H. T. HARRISON has been made district sales manager of the Duraloy Co., at Cleveland. He was formerly connected with the New York office of the company.

J. B. GILLHAM and G. A. ANDERSON, of the Reliance Electric & Engineering Co., Cleveland, have been sent to the Los Angeles and San Francisco offices of the Utilities Equipment Corporation, sales and services representative for the Reliance company on the Pacific Coast.

C. A. JOHNSON, president, Gisholt Machine Co., Madison, Wis., has been elected a director of the Chamber of Commerce of the United States.

S. P. BUFFUM, who has been identified with the Pittsburgh Steel Co. for the past 11 years, has been made district manager of the Dallas, Tex., office of the company.

CHARLES D. MCCALL, who since 1926 has been connected with the engineering department of Chrysler Corporation, has joined the staff of Manning, Maxwell & Moore, Inc., and has been placed in charge of sales of Putnam machine tools in the Detroit territory, with headquarters in the General Motors Building.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

ESTABLISHED 1855

Thrift Again Has Its Day

IN our issue of Feb. 6 we commented on the emphasis put in the period of the late boom on the free spending of the wage-earner's pay—an emphasis that even went to the point of urging that thrift was no longer the virtue it commonly had been regarded. The new doctrine had fitted in well with high-pressure campaigns of installment selling, also with the new era preachment that only through constantly stimulated consumption by the worker could high wages and mass production be maintained. However, as the article referred to pointed out, with the slackening of demand following the speculative collapse of last fall, a change in the general thinking as to spending and saving might be expected. That is, the public mind was likely to be more appreciative of the old-time virtues of working and saving, which had temporarily been displaced by speculation and spending.

It is one of the immediately hopeful signs that already there is improvement in this very respect. Robert L. Hoguet, president of the National Association of Mutual Savings Banks, which met at Atlantic City last week, reported that in the first four months of 1930 the savings banks in New York State had increased their deposits by \$77,500,000, and that corresponding gains had been made in other States. Mr. Hoguet's comment is most significant:

The public is returning to a conception of saving that almost disappeared in the boom period. The proposition that wealth results from thrift regularly practised is more convincing in the spring of 1930. A year ago stocks could be bought at random, to yield 5 to 10 per cent a month. The rates paid by savings institutions became unattractive to many persons of small capital. Since it was easier to buy stocks upon margin than to pay for them outright, and always with the chance of rapid appreciation, savings accounts were drawn upon to finance stock purchases.

We saw the tendency before the break. When the inevitable happened, our banks were the immediate source of funds to carry on. During October and November we paid out millions every day for this purpose, but December saw a change that is continuing steadily. It has been a principle in our institution that savings increase when times are hard. These are not exactly hard times, but there has been a pinch and we see the principle justified. I believe business is well on the way to normal and I look for a substantial increase in savings accounts this year.

Among the favorable factors in the present situation none is more encouraging than this return of

normal thinking in respect to the relation between individual savings and increase of the national wealth in fixed capital. The country has made great progress in emancipation from the old-time alternation of feast and famine. But it is still true that the foundations of sound prosperity are built in times like the present when both producers and consumers are feeling the pressure of realities which they were all too prone to ignore under the spell of the new era illusions of 1929.

New Freight Cost Adjustments

FOR the first time since 1922, the metal consuming industry is undergoing the confusion incident to a major change in railroad freight rates. In July, 1922, rates were reduced 10 per cent, following the 40 per cent increase which became effective in August, 1920, but these were horizontal adjustments, affecting all producers and consumers and all districts alike. The present change, based on a mileage scale, upsets all old relationships and creates new situations, the ultimate effect of which can only be determined by a thorough trial of the schedules that became effective May 20.

Growing out of the Hoch-Smith resolution introduced in Congress, which called for an investigation of railroad freight rates on manufactured articles and their relationship to rates on farm products, the new rates were ordered by the Interstate Commerce Commission after an exhaustive investigation of the entire freight rate structure affecting articles of iron and steel.

There is no need to review the history of that case, which is familiar to all who have a vital interest in such matters. The order, as it at present stands, may be subject to minor readjustments, and several applications of that character are pending, but meanwhile the railroads are applying the rates prescribed, and interest now lies chiefly in the effect which these rates may produce on competitive conditions in industry.

So far as individual companies and producing districts are concerned, all gain something and lose something in the change. To what extent the gains and losses will offset each other remains to be seen. In one sense the district which is most affected is New England, which has for many years enjoyed a blanket rate of 36.5 cents on finished steel from Pittsburgh. The new rates to New England carry a differential of 10 per cent above those to the remainder of the official classification territory. Points in Maine will take rates varying from 43c. to 47c. per 100 lb., while the Boston rate is 40c.

Less-than-carload rates are not changed by the In-

terstate Commerce Commission order, except that where the new carload rate exceeds the l. c. l. rate the latter shall be brought up to the same amount as the carload rate. Such cases are rare, however, and in many instances the spread between the carload rate and the l. c. l. rate has been widened. An instance of this is the tariff from Coatesville, Pa., to Stamford, Conn. The old rates were 25.5c. per 100 lb. for carloads and 31c. for less carloads. The new carload rate is 21.5c., while the l. c. l. rate is unchanged. Thereby the spread between the carload rate and the l. c. l. rate is increased from 5.5c. to 9.5c. This happens sufficiently often to indicate the possibility that many buyers of steel in less-than-carload lots will be inclined to place carload orders when possible, as the freight saving will be considerable.

Another change which will be watched with interest is the establishing of 40,000 lb. as the minimum carload weight. This may, in a measure, offset whatever losses in revenue the railroads suffer from the general freight rate changes. The increase in the minimum carload probably will result in larger average shipments from mills and a good deal of less-carload business being diverted to jobbers.

Effects upon steel consuming industries may or may not be serious, but it is significant that most of the recent protests have come from consumers, particularly those in industrial sections which have had the advantage of a grouping arrangement, now supplanted by mileage scale rates. As many of these towns and cities vie with one another in offering certain industrial advantages, the influence of the new rate structure upon their future growth is a matter that concerns them vitally. Incidentally, many of the manufacturing plants in the country which were located close to sources of steel supply so that they might have the benefit of low delivered costs for their raw material lose some of this advantage through the quite general increase in short-haul rates, whereas long-haul rates are for the most part lower.

Price Declines Incoherent

TOO much attention is being paid to recent fluctuations in the general average of commodity prices and not enough attention to the details, in discussions of the trade recession and efforts to forecast the future. If the state of trade affects prices, one has a right to expect it to affect different groups of commodities variously according to their sensitiveness to such an influence, and one does not find in the details what one would expect.

People eat just the same and one would not expect much decline in farm products and foods, yet there has been a great decline in these groups. Building activity has greatly decreased and one would expect a large decrease in building materials, but there has been only a small decrease. If the rank and file of the people have smaller incomes, they are likely to curtail on housefurnishing goods, but we see that group has declined least of all. It is worth while then to go into details and note carefully what we shall find.

Using the Bureau of Labor's indices, just issued for April, one observes that the recent peak was July, which means strictly speaking the middle of the month, and that is quite logical as we know now that general

industrial activity reached its peak, allowing for seasonal variation, in June, according to the Federal Reserve Board's index.

For July, 1929, the commodity index stood at 98.0, the highest since September, 1928. Declines thereafter were continuous, but there was only one-tenth point decline from March to April of this year, when the number was 90.7, making 7.3 points decline from the peak nine months earlier.

This decrease is frequently taken as an index to, or a measure of, the trade recession, but a study of details greatly undermines such a view. The simplest way to bring this out is to arrange the groups of commodities in the sequence of their declines, whereupon the incoherence is apparent. The base of the system is the 1926 average for each commodity. April numbers, with the declines from July, 1929, are shown below:

	April	Decline in Nine Months
All commodities	90.7	7.3
Farm products	95.8	11.8
Foods	94.6	8.2
Textile products	85.5	7.3
Hides and leather products..	102.7	6.5
Metals and metal products..	98.8	6.2
Fuel and lighting materials..	77.9	4.1
Miscellaneous	78.5	2.8
Chemicals and drugs.....	91.0	2.4
Building materials	94.7	2.0
Housefurnishing goods	96.2	1.0

Given the bare facts that a trade recession, particularly in building, had occurred and that the average of all commodity prices had declined, who is there who would arrange the groups in anything like the tabulated sequence? Surely anyone would expect housefurnishing goods and building materials to be most affected, yet they fall at the bottom of the list. He would say people must still eat and would expect little decline in farm products and foods. Being then told that these things had the greatest decline he would look for some other influence than business depression as the cause and he would not have to look far.

Given all the figures our referee would probably assert that something was wrong, that if you are having declines you ought to get them in the things that would count, that would help stimulate activity. Reducing food prices does not help, reducing building materials and housefurnishings would help.

Short Work, Short Buying

WE have in mind an industrial plant situated in a rather remote place, where it is the solitary industry. It produces a commodity whereof there has grown during the last year an excessive industrial accumulation, and therefore curtailment of production to 50 per cent had to be instituted. This meant a corresponding reduction of workers. The company was sympathetic with its employees and arranged to equalize things among them by letting each man work three days a week instead of six.

Manifestly the company could not continue to produce goods that it could not sell. Manifestly it could not increase the wages of its employees; on the contrary the latter had willingly accepted a reduction in order to help things along previous to the occurrence of the final blow. Manifestly the inevitable result of a six-day week for half of the workers

or a three-day week for all of them did not increase the buying power of the community.

These things are so simple and self evident that equally self evident is the nonsense of William Green, president of the American Federation of Labor, in recommending a five-day week as an aid against unemployment and a creation of opportunity for workers to consume more of the goods produced by industry.

No less is the folly of some captains of industry in preaching high wages as a panacea for industrial ills. Not even Henry Ford pays high wages to his employees in Detroit unless they earn them, and no more will he do so to his new organization in Great Britain. He may arrange things so that workers of no particular minds of their own can earn more, and in so doing he is a sound benefactor.

The pay envelope carries forms of currency that are counters used for convenience in buying, but this does not alter the fact that work of one kind is exchanged for work of another kind, the products of work being largely represented by goods, and such an exchange is not promoted by not working.

Steel Prices and Profits

WE hear not a little about there being "poor salesmanship" in the steel industry, and we have detailed information as to profits of different steel companies. No information is ever supplied as to profits on the individual finished steel products. Everyone knows perfectly well that there are wide differences and one can readily pick out products that usually afford more profit than other products. What one would like to have is a detailed statement showing precise relationships.

Possibly this curiosity will never be satisfied, but if the information were made available it would undoubtedly prove helpful in a study of how merchandising methods could be improved. There is ground for objection to the expression "poor salesmanship." When applied to the steel industry as a whole it really means nothing, because salesmanship as such should be expected to bring about somewhat the same results in one finished product as in another and it is no secret that this is by no means the case. It is only the details, or the precise measures, that are lacking.

There is a disposition sometimes to refer to the personnel in a given finishing branch of the steel industry as being not up to par or as having got into bad competitive habits. As to personnel, a good case could not be made out by studying the individuals. They are much the same, one line with another, it being their circumstances that are different. As to the acquisition of bad habits, the inquiry should be as to how the bad habits chanced to originate.

Frequently in connection with low selling prices of a given steel product relative to cost there is reference to the number of competitors, to the effect that there are too many, but that means nothing. In a general way there are always too many competitors when the number exceeds one. By reason of consolidations there are only about three-fourths as many sheet producers as there were a few years ago, but profits per ton have not increased in keeping with that substantial reduction.

If the steel industry made as large profits throughout as it does on some items, it would do very well

indeed, while if it made as poor profits throughout as it does on some items, it would do quite poorly. This fact does not suggest mergers, for mergers intended to reduce competition are held illegal while mergers intended to variegate output merely provide an averaging, not a correction of the low items.

No small part of the variation in profits among finished steel products is due to difference in the classes of buyers. An illustration that must be taken with judgment is furnished by rails and nails respectively. Of course there are more nail makers than rail makers, but nails are bought by jobbers who are very competitive and use nails as a leader, hence being very keen about the last nickel a keg in buying. In a way the railroads are keen to buy at the lowest possible prices, which amounts to the same thing in effect, but when it comes to rails they have a large capital investment, and a lower price on fresh purchases would write a depreciation on a very much larger tonnage in service. Then there are steel buyers who make products sold in a clear cut market which they wish to maintain, as with such items as bolts, nuts and rivets, and other buyers who sell competitively to the general public, such as the automobile manufacturers. As steel sellers well know, that makes a big difference.

CORRESPONDENCE

Cast Iron of High Tensile Strength

To the Editor: In the May 15 number of THE IRON AGE, page 1484, J. F. Lincoln writing on cast iron states: "However, experience has shown that if a higher strength than 15,000 lb. per sq. in. in tension is used, dangerous results are encountered."

Mr. Lincoln is evidently in error, for from no end of tests of cast iron propeller hubs for ships, and for other purposes, which I have first hand data on, the tensile strength runs from 29,000 to 35,000 lb. The foundry had no trouble in making an iron with this tensile property and the castings in use were very satisfactory.

Mr. Lincoln seems to be knocking cast iron, for which there is no need, for cast iron has its uses and limitations just the same as cast steel has its uses and limitations.

CHARLES H. HUGHES.

Engineer, New Dorp, Staten Island, N. Y.

German Practices in Structural Welding

A SERIES of papers concerning structural welding, published with accompanying discussion in *Zeitschrift des Vereines deutscher Ingenieure*, Dec. 7, 1929, gives a picture of the state of the art in Germany. One of the articles describes the preliminary tests, design and construction of an all-welded railroad bridge, made of plate-girder spans 29 ft. long. The design used many details (flange-angles and cover plates) such as would be expected in riveted construction, and avoided Tee joints except for flange stiffeners. It is expected that the amount of welding may be materially reduced, and a saving in dead weight effected, when web and flanges are made of a series of plates butt-welded together, each with thickness graduated to the stress it is to carry.

Several highway bridges have been constructed with floors supported by standard I-beams whose flanges are reinforced with cover plates welded along the edge.

The Week in Business

Drift of Current Financial and Economic Opinion

It is probable that the decline of our business curve is at an end, says the Harvard Economic Society, "and that an upturn will occur either this month or next. . . . Curtailed output of various commodities because of current unprofitable prices, some signs of firmness in particular commodities and the continuing stimulus of cheap money give assurance that general prices are now approximately at bottom and will shortly improve. The rise . . . should bring the general averages, by the year's end, well above present levels."

The Harvard organization expects construction to show an appreciable improvement, leaving 1930 as a whole within 5 per cent of 1929. Continuance and broadening of the present upswing in manufacturing is expected, with the index in the autumn perhaps 5 per cent above normal. Exports will continue well below 1929, because of unsettled conditions abroad. Agricultural incomes are likely to run somewhat below last year, and the purchasing power of other sections of the community is adversely affected by the delay in industrial recovery.

General business is likely to improve continuously, or nearly continuously, through the rest of the year, with the most rapid gains in the third quarter and with the fourth quarter maintaining a level "substantially above normal," is the conclusion reached.

Similar cheerfulness is expressed by Alexander Hamilton Institute, based on various business indicators, among which "for the first time since the beginning of the year checks cashed, outside New York, in the week ended May 7 exceeded the volume of a year ago." And that retail trade in March-April was only 2 per cent below 1929 is cited as encouraging.

But some do not share this view. *Annalist* finds the indications in May not especially favorable, and says: "There is nothing in sight to indicate that the next six months will see anything much different from the usual seasonal variations from the present low range of activity." And United Business Service thinks that business still awaits a revival of a now slack demand before again moving forward, "a development which we do not expect to occur before fall."

That money rates are showing a

constantly easing tendency is thought by National Industrial Conference Board to indicate that "the turn in prices may be nearer than generally realized." There is much confusion regarding the significance of these easy money rates. Colonel Ayres points to their "definite easing" as the best evidence that the decline in business has reached its bottom, and that hope for improvement is thereby justified. He sees signs of gradual improvement in the volume of general business.

But Benjamin Baker, in *Annalist*, takes a different view. Easy money, he says, "is always reached by a decline in business activity which releases funds from their ordinary usage."

This commentator looks to the steel industry to supply the first definite mark of sustained improvement in the American business structure, saying: "Steel ingot production is not only the best single indication of business activity; it is also an indicator of a high degree of accuracy." Increased rate of ingot output and cessation of the marked price weakness in finished steel are, he believes, the things to be watched as barometers.

Conference Board Elects Officers

The National Industrial Conference Board at its fourteenth annual meeting, May 15, at the Hotel Astor, New York, reelected Charles Cheney, president, Cheney Bros., South Manchester, Conn., chairman of the board for the ensuing year, while Magnus W. Alexander continues as president and chief executive of the organization. Frederick P. Fish of Fish, Richardson & Neave remains honorary chairman.

Fred I. Kent, director of the Bankers Trust Co., New York, was reelected treasurer of the Conference Board and the following vice-chairmen were elected: Irene du Pont, E. I. du Pont de Nemours & Co., Wilmington, Del.; Herbert F. Perkins, president, International Harvester Co., Chicago; W. C. Dickerman, president, American Locomotive Co., New York; and Thomas J. Watson, president, International Business Machine Corporation, New York.

The executive committee for the year will be composed of these offi-

cers and John Henry Hammond, member of Brown Brothers & Co., New York; Howard Heinz, president, H. J. Heinz Co., Pittsburgh; R. C. Holmes, president, Texas Co., New York; and Malcolm B. Stone, treasurer, Ludlow Manufacturing Associates, Boston. Loyall A. Osborne, president, Westinghouse Electric International Co., New York; A. Farwell Bemis, chairman, Bemis Brothers Bag Co., Boston; Cornelius F. Kelley, president, Anaconda Copper Mining Co., New York, and Matthew S. Sloan, president, New York and Brooklyn Edison companies, New York, are ex-officio members of the committee.

In the forenoon Magnus W. Alexander, president, delivered the annual address entitled "Industry's Age of Reason." He also spoke of vital economic problems facing American industry and outlined those that the Conference Board has been, or is now, studying as an aid to industrial management. Frank B. Jewett, president, Bell Telephone Laboratories, Inc., spoke on "The Science Motif of the Chicago World's Fair Centen-

nial." "World Sources of Energy and the Competitive Position of Fuel Oil" was the theme of the afternoon discussion.

New Corporation Plants to Make 24-In. Pipe

The National Tube Co. has virtually completed a tube mill at Lorain, Ohio, which will make seamless pipe up to 24 in. in diameter. It recently completed a mill at Gary, Ind., that makes seamless pipe up to the same size. A third plant, which will make pipe up to 24 in. by an electric welding process, is being constructed at McKeesport, Pa., and is expected to get into production during the summer.

Heretofore the largest seamless tubing made has been 13½ in., for oil well casing. The large diameters, made by these plants, will be chiefly for natural gas line pipe. The Gary mill makes 30-ft. lengths and the other two mills are equipped to make greater lengths.

Iron and Steel Markets

Prices Continue to Decline

Body Sheets, Enameling Stock, Plates and Shapes Off
\$2 a Ton—Melting Scrap Drops Another 50c.
at Pittsburgh—Structural Awards Large

WITH prices still giving ground and with selling increasingly aggressive, the lull in the iron and steel market has become more pronounced. Measured in terms of specifications received by producers, demand is still receding, but how much of the decline is due to caution rather than to reduced consumption is not yet apparent.

Business sentiment, rendered extremely conservative both by price developments and the approach of the customarily dull summer season, has also been chilled by the recent secondary reaction in the stock market.

Steel ingot production shows wide variations, with certain producers running at as low as 50 per cent of capacity, but the general average, influenced by the superior performance of companies with diversified output, is 74 per cent, a decline of only 1 point from the 75 per cent rate of a week ago. The Steel Corporation average is unchanged at 80 per cent of capacity.

Additional price recessions have occurred in both primary and finished materials. The scrap market is uniformly weak, and heavy melting steel has declined 50c. a ton at Pittsburgh, \$1 a ton at Birmingham and 25c. a ton at Cincinnati. Pig iron prices are nominally unchanged, although subject to shading. The general trend of foundry operations is downward, the only conspicuous exception being the melt of companies making castings for Ford and Chevrolet automobiles.

Automobile body sheets and vitreous enameling stock have gone down \$2 a ton to 3.70c. and 3.80c. a lb., Pittsburgh, respectively. Another general reduction of \$2 a ton has occurred in plates and shapes, following concessions that were localized a week ago. The market on these products is now 1.80c. a lb. at Chicago and 1.70c. at Pittsburgh.

Prices on continuous sheets show greater irregularity and cold-rolled strip is more generally available at 2.45c. a lb., or \$2 a ton below nominal mill quotations. Weakness has extended to semi-finished steel, with concessions of \$1 to \$2 a ton reported on sheet bars, billets and slabs.

THE IRON AGE composite price for finished steel, which has been declining for nearly ten months, is now 2.214c. a lb. This figure is \$4.32 a ton above the low point of the post-war slump, which was reached in

the last week in February, 1922, following an uninterrupted decline lasting 18 months.

The less severe character of the present business recession, coupled with the fact that price reaction has already gone far, has caused some observers to persist in the view that a turn is not far away. It is true that the iron and steel industry seems to be moving into the usual mid-year dull period, but steel company earnings are rapidly diminishing and considerations of cost are counted on to influence the trade's attitude on prices.

Current business is not without its encouraging features. Fabricated structural steel awards, at 51,000 tons, are the largest since the second week in February. More than half of the current total is represented by two projects, a 20,000-ton office building in New York and a 7500-ton bridge for the Santa Fe at Chillicothe, Ill. The large amount of pending work has been swelled by inquiries aggregating 30,500 tons. Demand for reinforcing steel is sustained, with 13,000 tons of new business up for bids.

Line pipe remains active, with producers, some of which are now booked for several months, figuring on twice the tonnage that has been placed. The Gulf Refining Co. has entered the market for 1000 miles of pipe.

Motor car production shows little change, with the Ford and Chevrolet companies accounting for most of the automotive demand for steel. The outlook for June is uncertain, as some automobile makers plan to increase operations slightly, while others will curtail. Current shipments of steel to the motor car industry are estimated at 60 per cent of those a year ago.

Farm equipment makers, particularly manufacturers of harvesting equipment, are reducing output. Lessened demand, the receipt of the first cancellations in years, and the uncertainty of prices for farm products are mentioned as contributing factors.

Makers of tin plate, following the accumulation of anticipated tonnage, are scaling down their schedules, and rail mills, now on an 80 per cent basis at Chicago, will reduce operations in June. Specifications from railroad car builders continue to decline.

THE IRON AGE composite price for finished steel, at 2.214c. a lb., compares with 2.228c. last week. The pig iron composite remains at \$17.58 a gross ton.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
No. 2 fdy., Philadelphia.....	\$19.76	\$19.76	\$20.26	\$21.76
No. 2, Valley furnace.....	18.50	18.50	18.50	18.50
No. 2, Southern, Cin'ti.....	16.69	16.69	16.69	18.69
No. 2, Birmingham.....	14.00	14.00	14.00	15.00
No. 2 foundry, Chicago*.....	19.00	19.00	19.50	20.00
Basic, del'd eastern Pa.	18.75	18.75	18.75	20.25
Basic, Valley furnace.....	18.50	18.50	18.50	18.50
Valley Bessemer, del'd P'gh..	20.76	20.76	20.76	20.76
Malleable, Chicago*	19.00	19.00	19.00	20.00
Malleable, Valley	19.00	19.00	19.00	19.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace ...	94.00	94.00	94.00	105.00

Rails, Billets, Etc., Per Gross Ton:	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh..	33.00	33.00	33.00	36.00
Sheet bars, Pittsburgh.....	33.00	33.00	33.00	36.00
Slabs, Pittsburgh	33.00	33.00	33.00	36.00
Forging billets, Pittsburgh....	38.00	38.00	38.00	41.00
Wire rods, Pittsburgh.....	36.00	36.00	38.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb. ...	1.80	1.80	1.85	1.85

Finished Steel,	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.75	1.75	1.80	1.95
Bars, Chicago.....	1.85	1.85	1.90	2.05
Bars, Cleveland.....	1.75	1.75	1.80	1.95
Bars, New York.....	2.08	2.09	2.14	2.29
Tank plates, Pittsburgh.....	1.70	1.75	1.80	1.95
Tank plates, Chicago.....	1.80	1.85	1.90	2.05
Tank plates, New York.....	1.98	1.97 1/2	2.02 1/2	2.22 1/2
Structural shapes, Pittsburgh	1.70	1.75	1.80	1.95
Structural shapes, Chicago...	1.80	1.85	1.90	2.05
Structural shapes, New York	1.95 1/2	1.94 1/2	1.99 1/2	2.19 1/2
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh..	1.70	1.70	1.70	1.90
Cold-rolled strips, Pittsburgh	2.45	2.55	2.55	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh...	2.55	2.55	2.55	2.85
Sheets, black, No. 24, Chicago				
dist. mill.....	2.65	2.65	2.65	3.05
Sheets, galv., No. 24, P'gh...	3.20	3.20	3.30	3.60
Sheets, galv., No. 24, Chicago				
dist. mill	3.30	3.30	3.40	3.80
Sheets, blue, No. 13, P'gh....	2.15	2.15	2.15	2.10
Sheets, blue, No. 13, Chicago				
dist. mill	2.25	2.25	2.25	2.30
Wire nails, Pittsburgh.....	2.15	2.15	2.15	2.65
Wire nails, Chicago dist. mill	2.20	2.20	2.25	2.70
Plain wire, Pittsburgh.....	2.30	2.30	2.40	2.50
Plain wire, Chicago dist. mill	2.35	2.35	2.45	2.55
Barbed wire, galv., P'gh.....	2.80	2.80	2.95	3.30
Barbed wire, galv., Chicago				
dist. mill	2.85	2.85	3.00	3.35
Tin plate, 100-lb. box, P'gh..	\$5.25	\$5.25	\$5.25	\$5.35

Old Material, Per Gross Ton:	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Heavy melting steel, P'gh....	\$15.00	\$15.50	\$15.75	\$17.75
Heavy melting steel, Phila....	13.50	13.50	13.75	16.50
Heavy melting steel, Chicago	12.50	12.50	13.00	15.25
Carwheels, Chicago.....	13.75	14.00	14.50	14.50
Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh.....	14.25	14.25	14.50	15.00
No. 1 cast, Philadelphia.....	14.00	14.00	15.00	16.50
No. 1 cast, Ch'go (net ton)...	12.75	12.75	13.50	15.50
No. 1 RR. wrot., Phila.....	15.00	15.00	15.00	16.00
No. 1 RR. wrot., Ch'go (net)	11.00	11.25	11.75	14.00

Coke, Connellsville,	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.50	\$2.50	\$2.60	\$2.75
Foundry coke, prompt.....	3.50	3.50	3.50	3.75

Metals,	May 20, 1930	May 13, 1930	Apr. 22, 1930	May 21, 1929
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	13.12 1/2	13.00	14.12 1/2	18.12 1/2
Electrolytic copper, refinery..	12.75	12.75	13.75	17.75
Tin (Strait), New York.....	31.37 1/2	32.87 1/2	35.87 1/2	43.75
Zinc, East St. Louis.....	4.62 1/2	4.60	4.75	6.65
Zinc, New York.....	4.97 1/2	4.95	5.10	7.00
Lead, St. Louis.....	5.40	5.50	5.40	6.75
Lead, New York.....	5.50	5.60	5.50	7.00
Antimony (Asiatic), N. Y. ...	7.40	7.50	7.75	9.00

PITTSBURGH

Lull in Steel Buying More Pronounced
with Continued Weakness in Prices

PITTSBURGH, May 20.—The lull in steel market activity in this district, which has been optimistically termed "temporary" since the beginning of the month, is even more pronounced. Specifications are light, orders are exceptionally hard to get, and the price structure is unsettled.

Competition for large tonnages in several lines of finished steel has brought out prices far under the quoted market, and Pittsburgh mills have entered competitive territory with quotations which figure back even lower at this basing point. Although it is true that such transactions are exceptional, they reflect the increasing aggressiveness of the larger companies in their efforts to maintain operations at a steady level. On the general run of small orders, recent market quotations prevail in the main, but even carload business is often considered desirable, and buyers may nearly always shop around with profit. Deliveries can be obtained quickly, and there is no reason for making future commitments.

The pipe industry, after several months of inactivity, has suddenly come to the front, and line pipe capacity of the Pittsburgh district is rapidly being booked ahead for several months. Orders of one large producer since the first of the month total more than 300,000 tons, and smaller companies are benefiting by the overflow. The volume of inquiry, either active or projected, in the market today is fully double the tonnage which has already been placed.

To a lesser degree, reinforcing bar and structural steel business is an encouraging factor in the present situation, although fabricating shops in the Pittsburgh district are not yet generally well engaged. On reinforcing bars, mill deliveries are lengthened to three or four weeks, and work in prospect promises an even larger accumulation of orders.

Steel ingot operations in this and nearby districts are still in process of gradual curtailment. In the greater

Pittsburgh area, including Youngstown, the ingot production rate is not above 70 per cent of capacity, although Allegheny County mills in the aggregate are engaged at a slightly higher rate. Finishing mill schedules are spotty, and a declining tendency is evidenced particularly in flat-rolled products. Independent makers of tin plate, which have rolled considerable anticipated tonnage, are scaling down their schedules, and the decline in sheet production, which has been going on since the beginning of the month, is unchecked. Rail and structural mills are well engaged, but on other products, with the exception of pipe, current tonnage releases hardly justify present mill schedules.

Plates and shapes are now being quoted rather freely at 1.70c., Pittsburgh, although 1.75c. still applies on small lots. The latter figure is also the ruling quotation on bars, which are considerably stronger than plates and shapes. Sheet quotations are unchanged, although a growing amount of tonnage is going at the low end of the quotable ranges. Cold-rolled strip

is more freely available at 2.45c. and 2.50c., although the official quotation of 2.55c., Pittsburgh, is still maintained. Hot-rolled strip, having reached rather low levels in recent weeks, is fairly well maintained.

The scrap market has declined sharply in the last week, with No. 1 heavy melting steel now quoted at \$14.75 to \$15.25, a decline of 50c. a ton from recent prices. Pig iron is very quiet, with market quotations unchanged.

Pig Iron.—No change is reported in this market, which is characterized by small orders for immediate shipment, with practically no future contracting. Valley merchant furnaces have shipped most of their output so far this month, but it is not yet certain that the new month will begin without an increased accumulation of iron. Quoted prices are unchanged at \$18.50, Valley, for basic and foundry iron, and \$19 for malleable and Bessemer, and these prices are doubtless applying on a considerable part of current orders. On contract business, however, the situation is not so clearly defined.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free.....	27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel. — Shipments are still light and new buying of billets, slabs and sheet bars is negligible. Most of the large buyers are covered by contract at prices which they feel are satisfactory, and any adjustments which are being made are not being brought to the attention of the trade in general. The \$33, Pittsburgh or Youngstown, quotation is still nominally considered the mar-

Price uncertainty contributes to steel market dullness.

* * *

Plates and shapes now generally 1.70c., Pittsburgh, on desirable business, with 1.75c. on small lots.

* * *

Prospective pipe line awards most promising feature of new business. One company has recently booked 300,000 tons, and double that amount is pending.

* * *

Structural steel and reinforcing bars, aside from pipe, only products showing signs of increasing demand.

* * *

Scrap market displays further weakness, with heavy melting steel off 50c. a ton.

ket, while forging billets are holding at \$38, Pittsburgh. Wire rods are unchanged at \$36, Pittsburgh or Cleveland, and demand is considerably lighter than it was last month.

Bars, Plates and Shapes.—The general run of specifications is holding at recent levels, and tonnage releases are sufficient to sustain a mill operation of about 70 per cent on plates and shapes, and slightly less on bars. Reinforcing bars are still a feature of the market, with tonnage accumulating on mill books and new inquiry coming out regularly. Early action is expected on a viaduct at Turtle Creek, Pa., requiring 1500 tons of reinforcing bars, for which the Booth & Flinn Co., Pittsburgh, is the general contractor.

Soft steel bars are moving to the automobile and agricultural implement industries at a fair rate, and alloy steel bars are somewhat more active this month than they were in March or April. Fabricated shops in the district are engaged at about 60 per cent of capacity, with the larger interests running at a better rate. The Jones & Laughlin Steel Corpora-

tion has taken 2000 tons of shapes for a building at Monaca, Pa., for the St. Joseph Lead Co. Specifications from the railroad car builders are light, although this business is keeping up steadily from week to week, and affords fair backlog tonnage for the mills. Plate demand in general is only fair, and new buying is confined to small lots.

Price uncertainty is responsible for a large part of the market dullness. Leading makers, rather than recognize any official quotation, are more inclined to call prices nominal, and meet competition as it develops. On plates and shapes quotations range from 1.70c. to 1.75c., Pittsburgh, while on bars the lower figure is much less common. Reinforcing bars are quotable at 1.80c., Pittsburgh, in this district.

Rail and Track Supplies.—Specifications are coming in at a fair rate, but new business is negligible. Some railroads have attempted to defer shipments on rail contracts until later in the year, but the larger buyers are going ahead with their rail laying programs as they were scheduled. No changes have been made in the price of spikes and tie plates, the former being quotable at \$2.80 a 100 lb. and tie plates at \$41.50 a ton.

Bolts, Nuts and Rivets.—Recent price reductions on bolts, nuts and large rivets have done little to stimulate business, although the market is well established at the new levels. Mill operations are holding at about 60 per cent of capacity. Bolts and nuts are quoted at 73 per cent off list, and large rivets at \$2.90 a 100 lb. Small rivets are unchanged at 70 and 10 per cent off list.

Tubular Goods.—No new line pipe awards have been announced in the last week, although a number of large jobs are pending, and this business promises to be very active in the summer. The National Tube Co. has booked sufficient business in the last few weeks to operate its present and projected line pipe capacity for several months. This includes new large diameter seamless mills at Gary, Ind., and Lorain, Ohio, which are already in production, and a mill at Mc-

THE IRON AGE Composite Prices

Finished Steel

May 20, 1930, 2.214c. a Lb.

One week ago.....	2.228c.
One month ago.....	2.264c.
One year ago.....	2.412c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1930	2.362c., Jan. 7;	2.214c., May 20
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

May 20, 1930, \$17.58 a Gross Ton

One week ago.....	\$17.67
One month ago.....	17.75
One year ago.....	18.71

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1930	\$18.21, Jan. 7;	\$17.50, May 13
1929	18.71, May 14;	18.21, Dec. 17
1928	18.59, Nov. 27;	17.04, July 24
1927	19.71, Jan. 4;	17.54, Nov. 1
1926	21.54, Jan. 5;	19.46, July 13
1925	22.50, Jan. 13;	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel	Base per Lb.
F.o.b. Pittsburgh mill.....	1.75c.
F.o.b. Chicago.....	1.85c.
Del'd Philadelphia.....	2.04c.
Del'd New York.....	2.08c.
F.o.b. Cleveland.....	1.75c. to 1.80c.
F.o.b. Lackawanna.....	1.85c. to 1.90c.
F.o.b. Birmingham.....	1.95c. to 2.00c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.75c. to 1.80c.
F.o.b. P'gh mills, cut lengths.....	2.00c. to 2.05c.
F.o.b. Birmingham, mill lengths.....	1.95c. to 2.00c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.65c. to 1.70c.
F.o.b. Chicago Heights mill.....	1.80c.
Del'd Philadelphia.....	1.94c. to 1.99c.

Iron

Common iron, f.o.b. Chicago.....	1.90c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.70c. to 1.75c.
F.o.b. Chicago.....	1.80c.
F.o.b. Birmingham.....	1.95c. to 2.00c.
Del'd Cleveland.....	1.88½c. to 1.93½c.
Del'd Philadelphia.....	1.90½c. to 1.95½c.
F.o.b. Coatesville.....	1.80c. to 1.85c.
F.o.b. Sparrows Point.....	1.80c. to 1.85c.
F.o.b. Lackawanna.....	1.80c. to 1.85c.
Del'd New York.....	1.98c. to 2.03c.
C.i.f. Pacific ports.....	2.20c.

Structural Shapes

	Base per lb.
F.o.b. Pittsburgh mill.....	1.70c. to 1.75c.
F.o.b. Chicago.....	1.80c.
F.o.b. Birmingham.....	1.95c. to 2.00c.
F.o.b. Lackawanna.....	1.80c. to 1.85c.
F.o.b. Bethlehem.....	1.80c. to 1.85c.
Del'd Cleveland.....	1.88½c. to 1.93½c.
Del'd Philadelphia.....	1.81c. to 1.86c.
Del'd New York.....	1.95½c. to 2.00½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.80c.
Wider than 6 in., P'gh.....	1.70c.
6 in. and narrower, Chicago.....	1.90c.
Wider than 6 in., Chicago.....	1.80c.
Cooperage stock, P'gh.....	2.10c. to 2.20c.
Cooperage stock, Chicago.....	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.45c. to 2.55c.
Strips, Cleveland.....	2.45c. to 2.55c.
Strips, del'd Chicago.....	2.75c. to 2.85c.
Strips, Worcester.....	2.60c. to 2.70c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.80c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails.....	\$2.15 to \$2.25
Cement coated nails.....	2.15 to 2.25
Galvanized nails.....	4.15 to 4.25
	Base per Lb.
Polished staples.....	2.60c. to 2.70c.
Galvanized staples.....	2.85c. to 2.90c.
Barbed wire, galvanized.....	2.80c. to 2.90c.
Annealed fence wire.....	2.30c. to 2.40c.
Galvanized wire, No. 9.....	2.75c. to 2.85c.
Woven wire fence (per net ton to re-tailers)	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.30c.
Spring wire.....	3.30c.
(Carload lots, f.o.b. Chicago)	
Wire nails.....	\$2.20 to \$2.30 (keg)
Annealed fence wire.....	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade.....	2.35c.

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Cut Nails

Cut Nails		Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.		\$2.45 to \$2.50
Less carloads, Wheeling or Reading		2.60

Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.00c. to 2.10c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.10c. to 2.20c.
No. 10, blue annealed, del'd Phila.....	2.32c. to 2.42c.
No. 10, blue annealed, B'ham.....	2.25c.

Sheets

Blue Annealed	Base per Lb.
No. 13, f.o.b. P'gh.....	2.15c. to 2.25c.
No. 13, f.o.b. Chicago dist.....	2.25c. to 2.35c.
No. 13, del'd Philadelphia.....	2.44c. to 2.54c.
No. 13, blue annealed, B'ham.....	2.40c.

Continuous Mill Sheets

No. 10 gage, f.o.b. P'gh.....	1.80c. to 1.90c.
No. 13 gage, f.o.b. P'gh.....	1.95c. to 2.05c.
(Usual range 24 in. to 48 in. wide)	

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.55c.
No. 24, f.o.b. Chicago dist. mill.....	2.65c.
No. 24, del'd Philadelphia.....	2.84c.
No. 24, f.o.b. Birmingham.....	2.80c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.80c. to 3.90c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	3.20c. to 3.30c.
No. 24, f.o.b. Chicago dist. mill.....	3.30c. to 3.40c.
No. 24, del'd Cleveland.....	3.43½c.
No. 24, del'd Philadelphia.....	3.49c.
No. 24, f.o.b. Birmingham.....	3.45c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.80c. to 2.90c.
No. 28, f.o.b. Chicago dist. mill.....	2.90c. to 3.00c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.70c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	3.80c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.80c. to 3.90c.
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Tin Plate

Standard cokes, f.o.b. P'gh district mills.....	\$5.25
Standard cokes, f.o.b. Gary.....	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.70	125-lb. coating I.C. \$15.90
15-lb. coating I.C. 13.40	30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60	40-lb. coating I.C. 18.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	Alloy Differential
S.A.E. Series	
2000 (¼% Nickel).....	\$0.25
2100 (1¼% Nickel).....	0.55
2300 (3¼% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, $\frac{3}{8}$ in. and larger.....	\$2.80
Spikes, $\frac{1}{2}$ in. and smaller.....	2.80
Spikes, boat and barges.....	3.00
Tie plate, steel.....	2.07½

Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld		Iron	
Steel	Black	Galv.	Black
Inches			
1/8.....	47	21½	1/8 and 3/8.....+11 +36
1/4.....	53	27½	1/4.....23 5
3/8.....	58	44½	3/8.....28 11
1/2.....	62	50½	1 and 1½.....31 15
3/4.....	64	52½	1½ and 2.....35 18

Lap Weld

2.....	57	45½	2.....23 9
2½ to 6.....	61	49½	2½ to 3½.....28 13
7 and 8.....	58	45½	4 to 6.....30 17
9 and 10.....	56	43½	7 and 8.....29 16
11 and 12.....	55	42½	9 to 12.....26 11

Butt Weld, extra strong, plain ends

1/8.....	43	26½	1/8 and 3/8.....+13 +48
1/4.....	49	32½	1/4.....23 7
3/8.....	55	44½	3/8.....28 12
1/2.....	60	49½	1 to 2.....34 18
3/4.....	62	51½	
2 to 3.....	63	52½	

Lap Weld, extra strong, plain ends

2.....	55	44½	2.....29 13
2½ to 4.....	59	48½	2½ to 4.....34 20
4½ to 6.....	58	47½	4½ to 6.....35 19
7 to 8.....	54	41½	7 and 8.....31 17
9 and 10.....	47	34½	9 to 12.....21 8
11 and 12.....	46	33½	

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in.....	38
2½ in.—2¾ in.....	46
3 in.....	52
3½ in.—3¾ in.....	54
4 in.....	57
4½ in. to 6 in.....	46
1½ in.....	1
1¾ in.....	8
2 in.—2¼ in.....	13
2½ in.—2¾ in.....	16
3 in.....	17
3½ in. to 3¾ in.....	18
4 in.....	20
4½ in.....	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	Hot Rolled
1 in.....	61
1½ to 1¾ in.....	53
1¾ in.....	37
2 to 2½ in.....	32
2½ to 2¾ in.....	40
3 in.....	46
3½ to 3¾ in.....	48
3¾ in.....	51
4½, 5 and 6 in.....	40

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

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Seamless Mechanical Tubing

Per Cent Off List	
Carbon, 0.10% to 0.30% base (carloads)...	55
Carbon, 0.30% to 0.40% base.....	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Keesport which will become active in mid-summer. This company has taken a part of the requirements of the Cities Service line from Oklahoma to Chicago, and a report that the remainder of this tonnage has been booked by the Milwaukee fabricator cannot be confirmed in this district. The inquiry of the Phillips Petroleum Co. for a 350-mile gasoline line from Texas to Kansas City is very active, and the Barnsdall Corporation is soon expected to close on its line from Oklahoma to Milwaukee. Other projects are in various stages of contemplation, and Pittsburgh and Valley mills are preparing bids on a very heavy tonnage.

Demand for standard pipe is still unseasonably dull, although showing slight improvement from week to week. Mechanical and boiler tubes are also quiet, although shipments of the former to the automobile industry have been slightly heavier this month.

Wire Products.—Both sales and shipments of wire products this month are falling considerably behind April, although there is still a fair demand for bright hard wire from the manufacturing trade. The entire line of merchant wire products is decidedly quiet, and with the season at an end for barbed wire and fencing little improvement is in sight. Shipments of nails are light and new buying is negligible. In the Pittsburgh district the \$2.15 Pittsburgh price is well established on nails, and manufacturers' wire is holding at 2.30c.

Sheets.—This market has changed little in the last week, and the downward trend in production schedules is still in evidence. The industry as a whole is now running at about 70 per cent of theoretical full, with the leading interest averaging slightly better. Specifications are spotty and usually call for small tonnages for immediate delivery.

Shipments to the automobile industry are at about 60 per cent of those of the same period last year and further change in that consuming industry is most likely to be on the side of curtailment. Early reports indicate that the two large makers of low-priced cars will continue their present schedules through June.

Electric refrigerator makers are still taking heavy shipments and there are signs of improvement from the radio industry, which has been dormant for several months. Producers of sheet steel building products are still restricting their operations and have been a disappointment as an outlet for steel thus far in the year.

Prices are unsettled, but mill quotations have not been officially revised to meet the lower figures which have been in evidence for several weeks. The leading producer continues to quote 2.65c., Pittsburgh, on black sheets, 3.30c. on galvanized, 2.10c. on light plates and 2.25c. on blue annealed sheets. A large part of the tonnage now being booked is going at prices \$2 a ton less. Con-

tinuous mills are quoting prices about \$4 a ton less than the jobbing mills on light plates and blue annealed sheets and in a few cases the spread has been widened to \$6 a ton. Automobile body sheets are weak at 3.80c., while the price of the steel furniture grade seems to be settling to a flat 3.80c. Tin mill black is unchanged at 2.80c. to 2.90c.

Tin Plate.—Tin mill operations are unchanged this week at about 80 per cent of capacity, but the independents have rolled considerable anticipated tonnage and further curtailment in operating schedules is expected before the end of the month. The leading interest is running at slightly less than 75 per cent and one or two independents are still maintaining a capacity rate. Crop reports are generally of a favorable nature and shipments to the container manufacturers will likely increase sharply in the next 30 days.

Strip Steel.—Hot-rolled strip makers are still engaged at about 75 per cent of capacity, but business has failed to continue its recent improvement and most companies are doing well to maintain this rate. The automobile industry is the principal source of outlet, and schedules at Detroit have not increased since they were established early in the month.

Prices on hot-rolled material are holding at 1.70c. and 1.80c., Pittsburgh, for the wide and narrow sizes, respectively, and small orders still command a \$2 a ton premium. The situation in cold-rolled strip is not nearly so favorable, and prices are generally termed chaotic. Mill quotations are unchanged at 2.55c., Pittsburgh, but this figure is freely shaded \$2 a ton and 2.40c., has been done in Detroit.

Coal and Coke.—The decline of 10c. a ton in furnace coke prices has not

stimulated business, but operators generally believe that any further price concessions would do little to develop business. The \$2.50, Connellsville figure applies to such business as is being placed. Production is declining in the Connellsville region. Foundry coke is also very quiet and output has been fairly well adjusted to meet current demand. Coal prices lack strength, except in the case of slack, which is still quoted at recent advanced levels.

Old Material.—With the closing of the Pennsylvania Railroad list a few days ago, the scrap market showed signs of a further decline, which has been accentuated in the last few days. Recent sales of both No. 1 heavy melting steel and hydraulic compressed sheets have established \$15.25 as the top of the market, a decline of 50c. a ton from last week's quotations. Other grades are correspondingly weak, and dealers are offering scrap freely to mills at prices under the established market in many cases, although some of this material might be termed distress tonnage. Mills are generally disinterested, and the situation is very weak.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel..	\$14.75 to	\$15.25
No. 2 heavy melting steel..	12.75 to	13.25
Scrap rails	14.00 to	15.00
Compressed sheet steel....	14.75 to	15.25
Bundled sheets, sides and ends	13.00 to	13.50
Cast iron carwheels.....	13.50 to	14.00
Sheet bar crops, ordinary..	16.50 to	17.00
Heavy breakable cast....	11.50 to	12.00
No. 2 railroad wrought....	14.75 to	15.25
Hvy. steel axle turnings...	13.50 to	14.00
Machine shop turnings....	10.00 to	10.50
Acid Open-Hearth Grades:		
Railr. knuckles and couplers	18.50 to	19.00
Railr. coil and leaf springs	18.50 to	19.00
Roller steel wheels.....	18.50 to	19.00
Low phos. billet and bloom ends	20.00 to	20.50
Low phos. mill plates....	19.00 to	19.50
Low phos. light grades....	19.00 to	19.50
Low phos. sheet bar crops.	19.50 to	20.00
Heavy steel axle turnings.	13.50 to	14.00
Electric Furnace Grades:		
Low phos. punchings....	18.00 to	18.50
Heavy steel axle turnings.	13.50 to	14.00
Blast Furnace Grades:		
Short shoveling steel turnings	10.50 to	11.00
Short mixed borings and turnings	10.50 to	11.00
Cast iron borings	10.50 to	11.00
Rolling Mill Grades:		
Steel car axles	21.50 to	22.50
Cupola Grades:		
No. 1 cast	14.00 to	14.50
Rails 3 ft. and under....	17.50 to	18.00

Republic Consolidates Sales Offices

The Republic Steel Corporation announces that sales offices of the Central Alloy Steel Corporation and the Donner Steel Co. have been established at Youngstown.

The company has closed a contract to supply pipe for the new Carew building development in Cincinnati, requiring 1500 tons.

Illinois Steel Co. has recently lighted at Gary Works its No. 10 blast furnace, which has been enlarged to a daily capacity of 1000 tons. No. 8 furnace is to be taken out of service and will be rebuilt to increase its output to above 1000 tons a day.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes...	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.60c.
Galv. sheets (No. 24), 25 or more bundles	4.25c.
Light plates, blue annealed (No. 10), 1 to 24 plates.....	3.20c.
Blue annealed sheets (No. 13)....	3.25c.
Galv. corrug. sheets (No. 28), per square	4.13c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb. \$3.50	
Wire, black, soft ann'd, base per 100 lb.	\$2.75 to 2.85
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg. 2.60 to 2.75	
Cement coated nails, per keg 2.65 to 2.80	

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in. Pittsburgh	\$33.00
Rerolling, 4-in. and under 10-in., Youngstown	33.00
Rerolling, 4-in. and under 10-in., Cleveland	33.00
Rerolling, 4-in. and under 10-in., Chicago	34.00
Forging quality, Pittsburgh	38.00

Sheet Bars	
	(Open Hearth or Bessemer)
	Per Gross Ton
Pittsburgh	\$33.00
Youngstown	33.00
Cleveland	33.00
Slabs	
	(8 in. x 2 in. and under 10 in. x 10 in.)
	Per Gross Ton
Pittsburgh	\$33.00
Youngstown	33.00
Cleveland	33.00

Skelp	
	(F.o.b. Pittsburgh or Youngstown)
	Per Lb.
Grooved	1.80c. to 1.85c.
Universal	1.80c. to 1.85c.
Sheared	1.80c. to 1.85c.
Wire Rods	
	(Common soft, base)
	Per Gross Ton
Pittsburgh	\$36.00
Cleveland	36.00
Chicago	37.00

Prices of Raw Material

Ores	
	Lake Superior Ores, Delivered Lower Lake Ports
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$14.00 to \$16.50
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	
	Per Gross Ton
	\$22.00 to \$24.00
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	
	Per Lb.
	.50c. to .55c.

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$94.00 to \$99.00
Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Per Gross Ton Furnace	
10%	\$35.00
11%	37.00
12%	\$39.00
14 to 16%	45.00

Bessemer Ferrosilicon	
	F.o.b. Jackson County, Ohio, Furnace
	Per Gross Ton
10%	\$30.00
11%	32.00
12%	\$34.00

Silvery Iron	
	F.o.b. Jackson County, Ohio, Furnace
	Per Gross Ton
6%	\$22.00
7%	22.50
8%	23.00
9%	24.00
10%	\$25.00
11%	27.00
12%	29.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal del'd	\$1.40 to \$1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltitium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Aniston, Ala., per gross ton	\$122.50

Fluxes and Refractories	
Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.00 to 18.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
	Per 1000 f.o.b. Works
	High-Heat Intermediate Duty Brick Heavy Duty Brick
Pennsylvania	\$43.00 to \$46.00 \$35.00 to \$38.00
Maryland	43.00 to 46.00 35.00 to 38.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00 35.00 to 38.00
Kentucky	43.00 to 46.00 35.00 to 38.00
Missouri	43.00 to 46.00 35.00 to 38.00
Illinois	43.00 to 46.00 35.00 to 38.00
Grand fire clay, per ton	7.00

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
	Per 100 Pieces
	(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)
	Per Cent Off List
Machine bolts	.73
Carriage bolts	.73
Lag bolts	.73
Plow bolts, Nos. 1, 2, 3 and 7 heads	.73
Hot-pressed nuts, blank or tapped, square	.73
Hot-pressed nuts, blank or tapped, hexagons	.73
C.p.c. and t. square or hex. nuts, blank or tapped	.73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagon nuts	.73
Semi-finished hexagon castellated nuts, S.A.E. 73	.73
Stove bolts in packages, P'gh. 80, 10, 10 and 5	.73
Stove bolts in packages, Chicago. 80, 10, 10 and 5	.73
Stove bolts in packages, Cleveland. 80, 10, 10 and 5	.73
Stove bolts in bulk, P'gh. 80, 10, 10, 5 and 2 1/2	.73
Stove bolts in bulk, Chicago. 80, 10, 10, 5 and 2 1/2	.73
Stove bolts in bulk, Cleveland. 80, 10, 10, 5 and 2 1/2	.73
Tire bolts	.60, 10 and 10
Discounts of 73 per cent off on bolts and nuts applied on carload business.	

Large Rivets	
	(1/2-in. and larger)
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00

Small Rivets	
	(7/16-in. and smaller)
	Per Cent Off List
F.o.b. Pittsburgh	.70 and 10
F.o.b. Cleveland	.70 and 10
F.o.b. Chicago	.70 and 10

Cap and Set Screws	
	(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)
	Per Cent Off List
Milled cap screws	.80, 10 and 5
Milled standard set screws, case hardened	.80 and 5
Milled headless set screws, cut thread	.75 and 10
Upset hex. head cap screws, U.S.S. thread	.85 and 10
Upset hex. cap screws, S.A.E. thread	.85 and 10
Upset set screws	.80, 10 and 5
Milled studs	.70

CHICAGO

Plates and Shapes Decline \$1 a Ton—Finished Steel Demand Fairly Steady

CHICAGO, May 20.—Plates and shapes are off \$1 a ton to 1.80c. a lb., Chicago, for tonnage lots. Prices above this figure apply only to small and mixed orders, which are not wholly desirable in the arrangement of rolling schedules and in the added cost of routing through mills. Soft steel bars are being quoted at 1.85c., but this price lacks stability.

The flow of new business to Western mills remains in ample volume to hold backlogs moderately steady and to support ingot production at close to 90 per cent of capacity.

No. 8 blast furnace at the Gary Works has been blown out, leaving 26 steel mill furnaces in use out of 36 in the district. A merchant stack, No. 3 at Iroquois Works, will be blown in before the end of the week, bringing into blast all merchant furnaces in this territory.

Specifications for finished steel products are the largest in seven weeks and therefore mark a sharp upturn from the volume in the previous week. The relative uniformity of business in the West is interesting in that the aggregate tonnage holds, whereas there is a constant shift in the character of demand both as to the type of product and consuming interests. Support of operations is lessening on the part of rail schedules, and car shops are now past the point of maximum releases against orders on hand.

The farm implement group, especially manufacturers of harvesting machinery, is cutting production owing to lessened demand, the uncertainty of prices for farm products, the threat of overproduction of farm machinery and the fact that some builders have already received the first cancellations in several years.

On the other hand, structural awards, many being from the railroads, are measurably heavier. Fresh inquiry for oil storage tanks calls for about 20,000 tons of steel, and the prospect of oil and gas line business promises to make this a banner year in this field. About 18,000 tons of plates will be furnished by local mills for a pipe order placed within the week.

Coke.—Shipments of by-product foundry coke reflect a uniform melt in this district. The price is steady at \$8 a ton, f.o.b. local ovens.

Pig Iron.—No. 3 Iroquois furnace will be lighted before the end of the week. This will bring all merchant stacks in this district into use and will afford producers an opportunity to balance stocks, which gradually have been growing lighter in the last month or two. A melter in southern Wisconsin has placed 3000 tons. Other orders in the week were small and widely scattered.

Prices for iron from local furnaces are moderately steady at \$19 a ton, base, and Lake Erie iron, shipped by boat, is being sold at \$18 a ton, Chicago docks. Shipments of Northern iron continue to run ahead of the rate in April, and there is reason to believe, according to sellers, that total deliveries in May will top the aggregate

in the preceding month. Charcoal and Southern irons are quiet in a sluggish market.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25..	\$19.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75..	19.50
Malleable, not over 2.25 sil.....	19.00
High phosphorus	19.00
Lake Super. charc'l, sil. 1.50.....	27.04
S'th'n No. 2 fdy.....	\$18.20 to 19.01
Low phos., sil. 1 to 2, copper free..	29.50
Silvery, sil. 8 per cent.....	27.79
Bess. ferro-silicon, 14-15 per cent....	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Rails and Track Supplies.—Output of standard-section rails remains at 80 per cent of capacity, which is the revised rate established about May 1. Shipping schedules call for a steady volume to the end of this month, when production will again be cut to conform with lighter backlogs and the smaller needs of the railroads. New orders are small and widely scattered. The week's business in track supplies is of little moment. A few scattered orders have been entered for iron tie plates. The Canadian Pacific has let

contracts for the construction of 145 miles of branch lines.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. **Per lb.:** Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Sheets.—Prices for sheets in the immediate Chicago territory are undergoing severe pressure from competition, which is resulting in lower quotations to the south, with the center of the disturbance apparently at St. Louis. Black sheets at 2.65c. to 2.75c. a lb., mill, and the galvanized product at 3.30c. to 3.40c. are weak. Hot mills in this district are engaged between 70 and 75 per cent of capacity. Schedules are very unsatisfactory in that few units are booked for more than a few days at a time, and there is no assurance that mills started the first of the week will be operating four or five days later.

Users of roofing sheets are placing small orders, with little prospect of a change for the better before mid-July. Total releases by manufacturers of agricultural machinery show no variation from the average in recent weeks, but individual orders are lighter, reflecting greater caution. Practically all grades of sheets can be shipped from mills on short notice.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.70c. to 2.80c.; No. 24 galv., 3.35c. to 3.45c.; No. 10 blue ann'l'd, 2.25c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Cast Iron Pipe.—Demand for cast iron pipe is measurably lighter, although the number of lettings and inquiries is still quite large. Hammond, Ind., has rejected bids on 200 tons of 4 to 16-in. Class D pipe. This project will be readvertised. The Central Foundry Co. was successful bidder at Monticello, Ky., on 300 tons of 4, 6 and 8-in. pipe. The only public inquiry of note in the West is for 320 tons of 6, 8 and 10-in. pipe by Midland, Mich.

Sellers have little by which to gage the future. No large tonnages are overhanging the market, and inquiries are largely of the order of one or two carloads. Due to the character of current business, the price structure appears stronger, but this must be discounted because of the absence of heavy tonnage inquiries which usually reveal the true picture. The bulk of going tonnage is being taken at \$37 to \$38 a ton, Birmingham, for diameters 6-in. and larger. Interest by the railroads is steady, but individual orders are small. Buyers find that reasonably prompt delivery can be had on most sizes.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$45.20 to \$46.20; 4-in., \$48.20 to \$49.20; Class A and gas pipe, \$3 extra.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel—	
Under 5 tons	2.85c.
5 tons to 30 tons	2.45c.
30 tons and over.....	2.00c.
Rail steel reinforcement.....	1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares	4.10c.
Bands (¾ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)...	3.75c.
Black sheets (No. 24).....	4.05c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes (¾ in. and larger).....	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach or lag screws.....	60 and 10
Hot-pressed nuts, sq., tap. or blank,	60 and 10
Hot-pressed nuts, hex., tap. or blank,	60 and 10
No. 8 black ann'l'd wire, per 100 lb..	\$3.45
Com. wire nails, base per keg.	\$2.75 to 2.85
Cement c'd nails, base per keg	2.75 to 2.85

Wire Products.—Little can be said about this market except that it is moderately steady. Demand for manufacturers' wire has not changed in recent weeks. Jobbers are not now inclined to order larger tonnages than a week ago. However, dealers are encouraged over the way that business has held at this time when farmers are busy in the fields. Demand for magnet wire remains dull, with the radio industry operating below normal for this time of the year. Orders for heavy electrical cable were stimulated somewhat by the change in copper prices, but it is noticeable that most orders were for immediate construction programs.

Warehouse business.—Discounts on bolts, lag screws and nuts have been changed from 60 per cent off list to 60 and 10 per cent. Other quotations remain steady. Orders being taken from week to week are close to the average of the four years preceding 1929. Warehousemen generally feel that a turn for the better is near at hand.

Plates.—Sellers of this commodity have set 1.80c. a lb. as the minimum price on tonnage lots. Mixed orders and small requirements will be priced above this figure, in accordance with sellers' estimates of the added cost involved in handling business of this character.

Oil and gas line pipe contracts and projects are playing an increasing part in the iron and steel market. It is reported that the National Tube Co. has taken 85 miles and the A. O. Smith Corporation, 115 miles of 16-in. pipe for delivery to the Southern Natural Gas Corporation. These orders involve about 25,000 tons of steel. Pending business of like character, previously mentioned, includes a gasoline line from Philadelphia to Cleveland for the Sun Oil Co., involving 20,000 tons, a 400-mile line for the Columbia Gas & Electric Corporation, a 350-mile gasoline line for the Phillips Petroleum Co. and the Tulsa to Milwaukee line of the Barnsdall Corporation.

Structural Material.—Prices for tonnage lots are off \$1 a ton, the common quotation now being 1.80c., Chicago.

Awards in this district again are large, the aggregate for the week being over 15,000 tons. The largest contract was placed by the Santa Fe Railroad for a bridge over the Illinois River at Chillicothe, Ill., calling for 7500 tons. Fresh inquiries, at 7000 tons, are lighter than a week ago and are spread over a wide territory.

Bars.—Sales of mild steel bars are measurably heavier, and prices are holding at 1.85c. a lb., Chicago, in tonnage lots.

Specifications are coming from widely diversified users in aggregate tonnages which are steady from week to week. A manufacturer of light automobiles has placed large orders with Chicago forgers, who have entered sizable orders for forging bars

Flow of business, though changing in character, fairly steady, holding ingot rate at 90 per cent.

* * *

Curtailement in farm machinery group, but structural steel and pipe line tonnages are expanding.

* * *

Plates and shapes decline \$1 a ton to 1.80c.

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Sheet prices undergoing severe pressure, with current quotations weak.

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Scrap prices, lowest in many months, show no signs of returning strength.

with Chicago mills. Operations at alloy steel bar mills are holding the gains made a week ago. Specifications from the agricultural implement trade are slightly lighter, but some look upon this as a variation which may easily occur from week to week.

Prices for iron bars are weak, with occasional concessions of \$1 a ton. Rail steel bar mills are producing at a 75 per cent rate. Specifications are heavier, and for the first time in many weeks releases are in larger volume than production. Prices lack stability at 1.80c. a lb., Chicago Heights.

Reinforcing Bars.—Chicago bending shops continue to raise operating schedules, the average rate now being by far the best in many months. Among important new inquiries is 750 tons for a medical and dental building which the University of Illinois will add to its Chicago group. The general contract for the Galesburg, Ill., sewage disposal plant has been awarded and from all indications an order for 1200 tons of reinforcing bars will soon be placed. Shipments against the American Can Co.'s order for 4000 tons are moving rapidly from a Chicago shop. Road contractors are ordering out tonnage, and additional business of this character is in sight for delivery to southern Illinois.

Estimating departments are busy, especially on inquiries which call for small tonnages. Prices though somewhat more stable than earlier in the year, are still subject to variation on highly competitive work.

Bolts, Nuts and Rivets.—New business in these commodities is dull, notwithstanding the recent announcement of lower prices. Specifications are steady from most sources.

Old Material.—Upward of 15,000 tons of heavy melting steel has been placed for shipment to Gary mills at \$12.75 a gross ton, delivered. Other sales of this grade to consumers are lacking, but price quotations are holding in the range of \$12.50 to \$13 a

gross ton, delivered. In fact, the relative steadiness of prices for heavy melting steel is about the only favorable factor in this market. Offerings by railroads are large, and scrap is coming out on track in ample tonnages. Consumption of the steel grades remains heavy, and distress cars and rejections are no more troublesome than in recent weeks. Dealers are freely paying \$12.50 to \$12.65 a gross ton, delivered, for heavy melting steel to be shipped against orders at \$13.

Notable price reductions this week are on malleable and cast grades. Grate bars, brake shoes and agricultural malleable are off \$1 a ton. Prices being asked for many grades are the lowest in many months, and sellers are urging buyers to accumulate tonnages against future needs. Many buyers feel that the bottom has not yet been reached, and some closely adhere to the practice of close range purchasing. However, tonnages of cast grades are being purchased to add to stock piles.

The cast iron borings market is listless, dealers being able to make purchases freely at \$8.50 a gross ton, delivered. Railroad lists are large and bidding is dull, with resultant lower prices. Brake shoes and grate bars have recently been sold by a railroad at \$9 a net ton, delivered.

Prices delivered Chicago district consumers.
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$12.50 to \$13.00
Shoveling steel.....	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.25 to 13.75
Hydral. compressed sheets	11.25 to 11.75
Drop forge flashings.....	9.50 to 10.00
No. 1 busheling.....	10.25 to 10.75
Forg'd cast and r'd steel carwheels.....	15.50 to 16.00
Railroad tires, charg. box size.....	16.00 to 16.50
Railroad leaf springs cut apart.....	16.00 to 16.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	14.25 to 14.75
Coil springs.....	16.50 to 17.00
Electric Furnace Grades:	
Axle turnings.....	11.50 to 12.00
Low phos. punchings.....	13.50 to 14.00
Low phos. plates, 12 in. and under.....	13.50 to 14.00
Blast Furnace Grades:	
Axle turnings.....	10.00 to 10.50
Cast iron borings.....	8.75 to 9.25
Short shoveling turnings.....	8.75 to 9.25
Machine shop turnings.....	6.75 to 7.25
Rolling Mill Grades:	
Iron rails.....	13.50 to 14.00
Rerolling rails.....	14.75 to 15.25
Cupola Grades:	
Steel rails, less than 3 ft..	15.00 to 15.50
Steel rails, less than 2 ft..	15.75 to 16.25
Angle bars, steel.....	13.50 to 14.00
Cast iron carwheels.....	13.75 to 14.25
Malleable Grades:	
Railroad.....	15.50 to 16.00
Agricultural.....	13.50 to 14.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	13.50 to 14.00
Iron arch bars and transoms.....	15.00 to 15.50
Iron car axles.....	25.00 to 25.50
Steel car axles.....	15.50 to 16.00
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	11.00 to 11.50
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	7.25 to 7.75
Locomotive tires, smooth.....	14.50 to 15.00
Pipes and flues.....	8.00 to 8.50
Cupola Grades:	
No. 1 machinery cast.....	12.75 to 13.25
No. 1 railroad cast.....	11.25 to 11.75
No. 1 agricultural cast.....	10.50 to 11.00
Stove plate.....	9.50 to 10.00
Grate bars.....	9.25 to 9.75
Brake shoes.....	8.75 to 9.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

NEW YORK

Foundry Melt Declines with Proportionate Drop in Pig Iron Shipments—Steel Dull

NEW YORK, May 20.—Foundry melt has declined, now averaging between 50 and 60 per cent, and sales and shipments of pig iron have fallen off proportionately. Bookings, at 8000 tons, compare with a total of 5000 tons for the previous week. However, 2000 to 3000 tons of the current aggregate was for shipment outside of this district. Aside from two inquiries for 1000 tons each, the market is virtually bare of prospective business.

Certain accumulations of Buffalo barge iron that had been stored all winter are now being pressed for sale, accentuating the keen competitive situation in this territory. The absence of further open breaks in prices is attributed to the lack of market activity. However, the price of \$16, Buffalo, on No. 2 plain Northern iron has been shaded and the waiving of the silicon differential on No. 2X has become more frequent. Southern foundry iron continues to be offered at \$12.50, base Birmingham, or \$18, delivered alongside in New York harbor.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25.....	\$20.91 to \$21.41
*Buff. No. 2, del'd east. N. J.	19.28 to 19.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	19.39 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75.....	19.89 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Warehouse Business.—Buying of all products from stock continues limited to small lots. Shading of prices is not uncommon. Concessions on galvanized sheets are especially large, and desirable business has been taken at 4.10c. a lb., although 4.20c. or 4.25c., base, are usually the quotations on desirable orders. Demand for structural material is still small, but prices are being fairly well maintained.

Cast Iron Pipe.—Northern makers of pressure pipe continue to operate at close to 80 per cent of capacity, although the volume of new business is small. Prices are being maintained, and concessions from \$37 a net ton, f.o.b. foundry, only occasionally develop on large orders. Much of the present buying is in large-sized pipe for use in booster lines for gas and water, installations which utilities are making while demand for extensions of lines is inactive, because of lack of residential building. The Associated Gas & Electric System is inquiring for about 250 tons of gas pipe for Worcester, Mass., and about 75 tons of water pipe for Hewlett, L. I. Yonkers, N. Y., will open bids

May 22, on 500 tons of 30-in. water pipe.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$39.90 to \$40.90; 4-in. and 5-in., \$42.90 to \$43.90; 3-in., \$49.90 to \$50.90. Class A and gas pipe, \$3 extra.

Reinforcing Bars.—Railroad work looms large among the pending projects. A Pennsylvania Railroad pier at Jersey City, N. J., on which general contract bids will be taken May 22, calls for 4000 tons, and a Jersey City pier for the Erie Railroad in the same city, on which general contract tenders will be received late in June, will account for 2500 tons. Lettings are of average proportions, totaling 2375 tons. In the previous week awards amounted to 8550 tons.

Concrete bars in 40, 50 and 60-ft. lengths for mill shipment are quoted at 1.75c. a lb., base Pittsburgh. Warehouse prices range from 2.44c. a lb., f.o.b. cars, New York, for carloads or larger lots to 3.25c. for the smallest tonnages.

Finished Steel.—Excepting possibly structural steel and reinforcing bars, the demand for steel products in this territory is declining. Sales for the first two-thirds of May are not equal to the volume in the corresponding days in April, though no large falling off has occurred.

Developments in the price situation are of paramount interest in the mar-

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	4.25c.
Bands.....	3.75c.
Blue ann'd sheets (No. 10).....	3.60c.
Black sheets (No. 24*).....	3.80c. to 4.00c.
Galvanized sheets (No. 24*).....	4.25c. to 4.50c.
Long terne sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger.....	3.40c.
Smooth finish, 1 to 2 ½ x ½ in. and larger.....	3.75c.
Open-hearth spring steel, bases, 4.50c. to 7.00c.	
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	
Machine bolts, cut thread:	Per Cent
¾ x 6 in. and smaller.....	Off List
1 x 30 in. and smaller.....	60 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	60
¾ x 20 in. and smaller.....	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00
Tin Plate (14 x 20 in.)	
	Prime Seconds
Coke, 100 lb. base box...	\$6.45 \$6.20
Charcoal, per Box	A AAA
IC.....	\$9.70 \$12.10
IX.....	12.00 14.25
IXX.....	13.90 16.00

ket, and the uncertainty in buyers' minds may be a contributing factor in the restricted demand, though an equally important one is that most of the consuming industries are not getting increases in their own sales.

Plates are now being freely sold by Eastern mills at 1.80c. to 1.85c., Coatesville, Pa., which, with the new freight rate of 18c. per 100 lb., means 1.98c. to 2.03c., New York. Competition is keen for structural steel business, but 1.80c., Bethlehem, is applying on the ordinary tonnages. Cold-rolled strip steel has weakened, with sales at 2.45c. to 2.50c., Pittsburgh or Cleveland.

Coke.—Distress carloads of standard furnace coke continue to be offered at \$2.50 to \$2.60 a net ton, Connellsville, and occasionally at lower prices. With foundry operations considerably less than normal, shipments of foundry grade on contracts are sufficient for current requirements. Foundry coke prices are as follows:

Special brands of beehive foundry coke, \$4.85 a net ton, ovens, or \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material.—No important transactions in scrap are reported, and buying prices show a continued trend toward lower levels. Heavy breakable cast is being bought at \$12 a ton, delivered eastern Pennsylvania. For delivery to Florence, N. J., brokers are buying breakable cast at \$9.25, New York. Stove plate has declined to \$9.75 a ton, delivered eastern Pennsylvania, but in some cases \$10, delivered, is still being paid. Machine shop turnings are quoted at \$9, delivered, based on a recent sale to a Phoenixville, Pa., mill at \$9.50. This brings the buying price in New York to \$5.50 a ton. Stove plate for foundries is off 50c. a ton to \$8, New York, or about \$10, delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$9.50 to \$10.50
Heavy melting steel (yard)	6.75 to 7.25
No. 1 hvy. breakable cast..	8.75 to 9.50
Stove plate (steel works)...	6.50 to 7.00
Locomotive grate bars....	7.00 to 7.50
Machine shop turnings....	6.00 to 6.50
Short shovelling turnings..	6.75 to 7.00
Cast borings (blast fur. or steel works).....	6.50
Mixed borings and turnings.....	5.50
Steel car axles.....	17.00
Iron car axles.....	19.50 to 20.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	8.75
Forge fire.....	8.00
No. 1 railroad wrought....	10.00 to 10.50
No. 1 yard wrought, long..	9.00 to 9.50
Rails for rolling.....	10.00 to 10.50
Stove plate (foundry)....	8.50
Malleable cast (railroad)...	10.50 to 11.00
Cast borings (chemical)...	9.00
Prices per gross ton, deliv'd local foundries:	
No. 1 machry. cast.....	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size.....	13.00
No. 2 cast (radiators, cast boilers, etc.).....	12.50

PHILADELPHIA

Steel Prices Continue Weak— Mill Operations Decline

PHILADELPHIA, May 20.—Steel mill operations have declined further in the past week, and most of the eastern Pennsylvania producers are operating at less than 60 per cent of rated capacity. Shape mills report a slight improvement in specifications, but plate mills have received an unusually small tonnage of new business in the past week. The plate price has generally settled to 1.80c. a lb., Coatesville, Pa., even on lots of less than a carload. Floor plates have been reduced \$2 a ton to 3.55c. a lb., Pittsburgh. Award of about 20,000 tons of 6-in. seamless pipe by the Sun Oil Co., reported last week, was to the National Tube Co. and the Jones & Laughlin Steel Corporation.

Shipbuilding still offers a large potential market for plates, but lack of Government approval is delaying some construction. It is estimated that ships awarded to eastern Pennsylvania yards and awaiting approval by the Government will require about 150,000 tons of plates. The Sun Shipbuilding & Dry Dock Co., Chester, Pa., is beginning construction of five tankers of 13,500 deadweight tons for the Motor Tankship Corporation, requiring 25,000 to 30,000 tons of plates.

Pig Iron.—Foundries in this district are operating at low rates, and even among the larger consumers purchases of pig iron seldom exceed a carload lot. Prices continue at \$19 to \$19.50 a ton, furnace. Southern pig iron is quite generally offered at \$12.50, f.o.b. Birmingham furnace, but, with eastern Pennsylvania requirements small, buying is meager. Domestic low phosphorus iron is quoted at \$24 a ton, furnace, but foreign low phosphorus, of which 1900 tons arrived at this port last week from England, has been offered by British sellers at \$22.75, c.i.f. Philadelphia. Basic iron is quiet as eastern Pennsylvania consumers are covered for their nearby requirements.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$19.76 to \$20.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.26 to 20.76
East Pa. No. IX.	20.76 to 21.26
Basic (del'd east. Pa.)	18.75 to 19.00
Malleable	21.25
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'rg low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—Buying is small. Quotations continue at 1.75c. a lb., Pittsburgh, or 2.04c., delivered Philadelphia, based on the new freight rate of 29c. per 100 lb., effective today.

Reinforcing Bars.—A number of small projects are in the market, including a school at Wallingford, Del., an apartment building at 4313 Walnut Street, Philadelphia, and hospitals at Selinsgrove, Hamburg and Clark Summit, Pa. Billet steel bars are quoted at 1.80c. to 1.85c. a lb., Pittsburgh, or 2.09c. to 2.14c., delivered Philadelphia, with no extra for cutting to

length. Rail steel bars have recently been quoted at 1.65c. to 1.70c., Franklin, Pa., or 1.94c. to 1.99c., delivered Philadelphia, with no extra for cutting to length or bending.

Plates.—The price has settled to 1.80c. a lb., Coatesville, Pa., or 1.90½c. per lb., delivered Philadelphia, based on the new freight rate from Coatesville of 10½c. per 100 lb. Orders for plates recently have ranged from about five tons to carload lots, but oil companies and tank builders are becoming more active and substantial tonnage from shipbuilders is expected soon.

Shapes.—A slight improvement in demand is noted by shape mills in this district, but mill operations are still at about 60 per cent of capacity and prices are lacking in firmness. Quotations range from 1.75c. to 1.80c. a lb., f.o.b. nearest mill to consumer, or 1.81c. to 1.86c., delivered Philadelphia. In the new freight rate schedule effective today, \$23 a car, which formerly applied as a switching charge only on shipments to four points in the Philadelphia district, is extended to include six. Competition among fabricators is keen, and on desirable projects fabricated steel quotations have in certain instances been reduced considerably.

Sheets.—Demand for sheets has steadily declined since early in the month, and prices are only moderately firm, with mills seeking tonnage to sustain operations. Blue annealed sheets are quoted at 2.15c. a lb., Pitts-

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.55c.
Steel bands, No. 12 to ¼-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.80c.
*Galvanized sheets (No. 24)	4.25c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'd sheets (No. 13)	3.40c.
Diam. pat. floor plates, ¼-in.	5.30c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

burgh, or 2.24c., delivered Philadelphia, for No. 13 gage, and blue annealed plates at 2c., Pittsburgh, or 2.29c., Philadelphia, based on the new freight rate of 29c. per 100 lb. from Pittsburgh. Black sheets have settled to 2.55c. a lb., Pittsburgh, or 2.84c., delivered Philadelphia, and galvanized sheets are generally offered at 3.20c., Pittsburgh, or 3.49c., Philadelphia, which might be shaded \$1 a ton on a substantial tonnage.

Imports.—In the week ended May 17, 1900 tons of pig iron arrived at this port from the United Kingdom. Steel imports consisted of 1234 tons of structural shapes from Belgium, 45 tons from France and 27 tons from Germany, two tons of drill steel, one ton of bearing steel and 10 tons of steel billets from Sweden, 570 tons of strip steel, 29 tons of steel bars and 18 tons of bands from France, and 20 tons of steel bars from Belgium.

Old Material.—Transactions are so small that it is difficult to establish the minimum price on certain grades of scrap. Dealers appear willing to sell No. 1 heavy melting steel at \$13.50 a ton, delivered, but consumers have not exhibited much interest in contracts at this level. Specification pipe has been sold at \$12.50, delivered. The last sale of No. 1 forge fire was at \$12.50, delivered, and recently no offers have been made by either buyers or sellers.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$13.50 to \$13.75
No. 2 heavy melting steel	11.00 to 11.50
Heavy melting steel (yard)	10.50 to 11.00
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	10.50 to 11.00
Hydraulic compressed, new	12.50 to 12.75
Hydraulic compressed, old	10.00
Machine shop turnings (for steel works)	9.50
Heavy axle turnings (or equiv.)	12.00 to 12.50
Cast borings (for steel works and roll. mill)	10.00 to 10.50
Heavy breakable cast (for steel works)	12.50 to 13.00
Railroad grate bars	10.50
Stove plate (for steel works)	10.50
No. 1 low phos., hvy., 0.04% and under	20.00 to 20.50
Couplers and knuckles	19.00 to 19.50
Rolled steel wheels	18.50 to 19.00
No. 1 blast fnace scrap	9.50
Wrot. iron and soft steel pipes and tubes (new specific.)	12.50 to 13.00
Shafting	13.00 to 13.50
Steel axles	21.00 to 21.50
No. 1 forge fire	12.50
Cast iron carwheels	15.00
No. 1 cast	14.00 to 14.50
Cast borings (for chem. plant)	13.50 to 14.00
Steel rails for rolling	15.00 to 15.50

Minneapolis, St. Paul & Sault Ste. Marie Railroad, Minneapolis, Minn., is taking bids until May 28 for dismantling its No. 1 ore dock on Allouez Bay, Superior, Wis., erected in 1910-1911 and enlarged in 1916 at cost of \$2,000,000.

CLEVELAND

Steel Market Drifting—Automobile Body Sheets and Enameling Stock Down \$2 a Ton

CLEVELAND, May 20.—The steel market is drifting, with no appreciable change in the demand. Price reductions have not tended to stimulate business, as consumers are ordering only for their current needs. There is no change in local steel plant operations, Cleveland mills operating at 76 per cent of ingot capacity this week, the same as last week. There is little change in operations by consuming industries.

Considerable confusion is resulting from the new freight rates on steel that became effective today. The changes on the whole are expected to have little effect on the use of Cleveland as a basing point for steel bars, although some consumers in this territory who have been buying on a Cleveland base may find it to their advantage to buy on a Pittsburgh base and others to switch from a Pittsburgh to a Cleveland base. Steel fabricators, it is believed, will be affected more than other consumers by the change in rates.

Operating conditions in the automotive industry show little change. The Ford Motor Co., with the present daily output of 9300 cars, and the Chevrolet, with a production of 4400, are furnishing the bulk of the steel tonnage, as well as activity for the parts makers. The Buick Motor Co. is placing considerable tonnage for its new models that are to come out in August. Conditions are spotty with other motor car manufacturers. Some are expected to increase production slightly next month and others to curtail.

Prices on plates and shapes appear to be well stabilized at the new levels, but the sheet market is still weak. Automobile body sheets and enameling stock have been reduced \$2 a ton. There is a lower price trend on cold-rolled strip.

Pig Iron.—Sales are holding up to a recent rather moderate volume. Most orders are for small lots, and no consumers are buying for delivery beyond June. Some of the jobbing foundries in this territory and foundries making castings for Ford and Chevrolet cars are taking a little more iron than last month, but otherwise no change is reported in shipments.

The Otis Steel Co. Monday blew in one of its furnaces that had been out for relining. A Valley furnace is now making low phosphorus iron, which is inactive in this territory.

Local prices are holding to recent reductions. Foundry and malleable grades are quoted at \$18.50, furnace, for Cleveland delivery and \$18 for outside shipment. Quotations on these grades by other Lake furnaces range from \$18.50 in western Ohio to \$19.50 in eastern Michigan.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$18.50
S'th'n fdy., sil. 1.75 to 2.25	19.51
Malleable	18.50
Ohio silvery, 8 per cent.	28.00
Basic Valley furnace	18.50
Stand. low phos., Valley	\$26.50 to 27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore.—Consumption of Lake Superior ore during April amounted to 4,575,525 gross tons, a decrease of

52,913 tons for the month. The amount consumed in April, last year, was 5,417,491 tons. Ore in furnace yards and on docks May 1 amounted to 20,284,503 tons as against 15,929,901 tons on the same date a year ago. There were 162 furnaces using Lake ore in blast May 1, a decrease of two for the month.

Bars, Plates and Shapes.—Business in the heavier rolled steel products is not holding up to the April volume. Steel bars continue quiet. Plates show a slight improvement in small lots. Structural shapes are quieter than recently. Inquiry in the building field is slack. Prices on plates and shapes are being maintained at the recent reduction to 1.70c. to 1.75c., Pittsburgh, the lower price being general except for small lots. Steel bars are rather generally held at 1.85c., Cleveland, for local delivery, although for outside business 1.75c., Cleveland, is being named to some buyers. Outside mills quote 1.75c., Pittsburgh, when using a Pittsburgh base for shipment to this territory. Rail steel bars are \$1 a ton lower, being quoted at a minimum of 1.65c., mill, reflecting the price situation on billet steel bars and maintaining the usual \$2 a ton spread between the two grades.

Sheets.—The volume of business shows little change. Shipments to the automotive industry are holding up to recent rate, but demand from other sources is slow. The market is weak, and prices have declined \$2 a ton on automobile body sheets and vitreous enameling stock, the former now being quoted at 3.70c., Pittsburgh, and the latter at 3.80c. Concessions to 2.50c. on black sheets are still reported, but these evidently are confined to steel barrel manufacturers. Weakness previously reported in other districts on galvanized sheets is now in evidence in this territory, with 3.20c. the ruling price.

Semi-Finished Steel.—With a more competitive market situation, weakness has developed in semi-finished steel prices. While sheet bars, billets and slabs are being shipped against \$33 contracts, concessions of \$1 to \$2

a ton are reported. The leading local producer continues to operate 10 open-hearth furnaces.

Strip Steel.—The local demand for hot-rolled strip is slow, but some of the mills are getting a fair tonnage from the Detroit territory. Most business is going at 1.70c., Pittsburgh, for wide and 1.80c. for narrow strip. Cold-rolled strip is weaker, a 2.45c. Cleveland price having become quite general except for small lots. The present price is far below comparative material in sheet steel. Demand for cold-rolled strip continues very dull.

Bolts and Nuts.—Contracts have been revised, placing in effect the 10 per cent reduction to 73 per cent off list announced last week. Prices are being maintained at the reduced levels. Demand is still slow.

Old Material.—The market is almost at a standstill. Dealers are buying some scrap for yard stocks, but practically none for mill shipment, as they are nearly cleaned up on old orders. One local mill is willing to buy scrap, but at prices dealers will not accept. Local mills are still taking scrap in restricted quantities. One consumer in the Valley district has held up shipments on compressed sheet steel. While the market has a weak tone, prices are unchanged. However, there was not enough business during the week to test the market.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$13.00 to \$13.25
No. 2 heavy melting steel	12.50 to 12.75
Compressed sheet steel	12.50 to 12.75
Light bundled sheet	
stampings	11.00 to 11.50
Drop forge flashings	10.50 to 11.00
Machine shop turnings	9.00 to 9.50
Short shoveling turnings	10.50 to 11.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	9.75 to 10.00
Mixed borings and short turnings	9.75 to 10.00
No. 2 busheling	9.00 to 9.50
Cupola Grades:	
No. 1 cast	15.00 to 15.50
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Rails for rolling	16.25 to 16.50
Railroad malleable	16.00 to 16.50

The General Motors Corporation has arranged to acquire the Winton Engine Co., Cleveland, and has agreed to give 126,667 shares of General Motors common stock for the assets and property of the Winton company.

BIRMINGHAM Steel Scrap Declines \$1 a Ton—Steel Demand Steadier

BIRMINGHAM, May 20.—Pig iron orders are steady but light. Those who placed contracts at the beginning of the quarter still have unshipped tonnage sufficient for their requirements, and those who have not covered are buying only for requirements of actual orders booked, no stocks of consequence being carried. Shipments to district melters held their own last week, needs of pressure pipe shops being the chief factor in moving iron for district use.

The base price of \$14 for Birmingham district sales is unchanged. Active furnaces have totaled 17 for several weeks. Of this number, nine are on foundry iron, six on basic, one on recarburizing iron and one on ferromanganese.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.00
No. 1 fdy., 2.25 to 2.75 sil.....	14.50
Basic	14.00

Finished Steel.—Demand has apparently steadied itself from the decline that has been apparent this month. In some lines, especially wire products, rods, sheets and some forms of structural shapes, it is believed the bottom has been reached and the next turn in demand will be upward, though this is not expected until after the usual summer dull season has passed. Ingot production remains around 90 per cent of capacity. Structural steel fabricators have had another light week, there being a scarcity of both large and small jobs. Several good projects are ready for figures, but owners are slow about coming into the market. Reinforcing bars are finding a fair demand, chiefly for road and bridge work.

Active open-hearths total 19 of 23, the same as a week ago.

Cast Iron Pipe.—Lettings of pressure pipe during the past 10 days have been the lightest since the spring buying season opened. Birmingham plants have reduced backlogs. Makers report a favorable improvement in the outlook for the near future, the definite tonnages pending from municipalities being considerably better than two weeks ago. Industrial demand, of the small tonnage variety, is better. Shreveport, La., will open bids May 27 on 5970 ft. of 6-in. pipe, and Hattiesburg, Miss., is figuring on a large tonnage. Several small projects are pending in Texas. Laurel, Miss., opened bids today on 5900 ft. of 8- to 12-in. pipe.

The Central Foundry Co., Holt, Ala., has placed three shops on a full schedule of six days a week instead of three to five days a week as previously. The American Cast Iron Pipe Co. is replacing one of its old shops with a new building and new machinery.

Prices are unchanged at \$37 to \$38 a ton, Birmingham, for 6-in. and larger sizes.

Old Material.—Quotations on heavy melting steel, scrap steel rails, steel axles and rails for rolling are off \$1 a ton.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$12.00 to \$12.50
Scrap steel rails	12.50 to 13.00
Short shoveling turnings..	9.00
Cast iron borings.....	9.00
Stove plate.....	11.50 to 12.00
Steel axles	21.00 to 22.00
Iron axles	23.00
No. 1 railroad wrought....	10.00 to 10.50
Rails for rolling.....	14.50
No. 1 cast.....	13.00
Tramcar wheels.....	12.50
Cast iron carwheels.....	13.00 to 13.50
Cast iron borings, chem..	13.50 to 14.00

PACIFIC COAST

SAN FRANCISCO, May 17 (*By Air Mail*).—Demand for steel products fell off this week. Only one project involving more than 100 tons was reported. The United States Pipe & Foundry Co. secured 500 tons of 4 to 12-in. Class 250 pipe for Los Angeles. Pending business is not large. Prices are holding fairly well, plates being the weakest item.

New inquiries for reinforcing steel bars include 500 tons for the Aurora Avenue bridge, Seattle, and 420 tons for the Sixth Street viaduct in Los Angeles, bids to be opened on June 24 and June 11 respectively. Los Angeles quotations on out-of-stock material remain firm at 2.40c., base, in carload lots. San Francisco district prices are \$2 a ton lower. Mild steel bars continue to move in small lots, with prices holding firm at 2.35c., c.i.f.

The Seattle Boiler Works took the

Demand for Steel Products Slow—Prices of Plates Weak

only plate award, about 100 tons for two steel tanks for Everett, Wash. Plate prices are weak at 2.25c., c.i.f.

Structural shape awards were all small. Bids will be opened June 24 on 7500 tons for the Aurora Avenue bridge, Seattle. Bids have been taken on 300 tons for a building for the Salvation Army in Oakland. Plain material is firm at 2.35c., c.i.f.

Movement of blue, black and galvanized sheets is confined to unim-

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes..	2.45c. to 2.95c.
Soft steel bars.....	2.40c. to 2.95c.
Black sheets (No. 24).....	3.65c. to 4.30c.
Blue ann'l'd sheets (No. 10)	3.05c. to 3.55c.
Galv. sheets (No. 24).....	4.30c. to 4.80c.
Struc. rivets, 1/2-in. and larger.....	5.65c.
Com. wire nails, base per keg.....	\$3.40
Cement c't'd nails, 100 lb. keg.....	3.40

portant tonnages. Prices now applying on No. 10 gage blue annealed, No. 24 gage black and No. 24 gage galvanized sheets are 2.75c., 3.35c. and 4c., c.i.f. respectively.

Pig Iron.—Foundry activity is only fair, spring work having been below normal. Most sales and inquiries involve small lots for immediate shipment. No change in quotations is noted.

Prices per gross ton at San Francisco:

*Utah basic.....	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Cast Iron Pipe.—Only one cast iron pipe award of importance was noted, and pending business is confined to two projects involving over 100 tons each. Los Angeles has opened bids on 1002 tons of 16 and 20-in. Class 150 pipe. Long Beach, Cal., will open bids May 20 on 133 tons of various sizes.

Canada

Pig Iron Orders Small for Early Delivery

TORONTO, May 20.—With prices unchanged the demand for pig iron in the Canadian markets is holding at a satisfactory level. Current demand runs mostly to small tonnages for spot delivery, but sales for the week also included a couple of orders for delivery to the end of this quarter.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable	22.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable	24.00
Basic	22.50

Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carron	33.00

Structural Steel.—While some large orders are pending for early closing, new business is mostly confined to small tonnages. The Disher Steel Construction Company received an order for 400 tons of steel for the new Sun Oil Co. building at Toronto. Bids will be called about June 1 for approximately 4000 tons of steel for a bridge over the Fraser River near Lillooet, B.C., for the Pacific Great Eastern Railway, Vancouver.

Old Material.—According to Toronto and Montreal scrap dealers, a stronger demand for old material has sprung up since the first of this month. While most of the new business is for spot delivery and confined to small tonnages, some of the larger consumers are also coming into the market with contracts involving substantial tonnages to be delivered over

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	4.90c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

the next couple of months. Prices are unchanged.

Dealers' buying prices:

	Per Gross Ton	Toronto	Montreal
Heavy melting steel.....	\$9.00	\$8.00	
Rails, scrap.....	11.00	9.00	
No. 1 wrought.....	9.00	11.00	
Machine shop turnings.....	7.00	6.00	
Boiler plate.....	7.00	6.50	
Heavy axle turnings.....	7.50	6.50	
Cast borings.....	6.50	5.00	
Steel borings.....	6.50	6.00	
Wrought pipe.....	6.00	6.00	
Steel axles.....	14.00	17.00	
Axles, wrought iron.....	16.00	19.00	
No. 1 machinery cast.....	16.00	16.00	
Stove plate.....	12.00	12.00	
Standard carwheels.....	14.50	14.50	
Malleable.....	13.00	13.00	
Per Net Ton			
No. 1 mach'y cast.....	\$15.00		
Stove plate.....	11.00		
Standard carwheels.....	14.00		
Malleable scrap.....	11.00		

Universal Atlas Cement Co., subsidiary of the United States Steel Corporation, has moved its New York offices to the new Chrysler Building, consolidating offices which were maintained by the Universal Portland Cement Co. at 30 Church Street, and by the Atlas Portland Cement Co. of 25 Broadway and 41 East Forty-second Street. These two companies were merged a few months ago.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinf. bars.....	3.30c.
Rail steel reinf. bars.....	3.15c.
Hoops.....	4.05c.
Bands.....	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares.....	4.35c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in., 4-in.....	\$16.50
Seamless steel boiler tubes, 2-in., 4-in.....	17.50
4-in.....	36.00

ST. LOUIS

Pig Iron Market Quiet, Steel Demand Spotty and Scrap Continues Weak

ST. LOUIS, May 20.—The pig iron market continues quiet. Sales of the St. Louis Gas & Coke Corporation during the week amounted to about 2500 tons, of which 2000 tons of basic went to an East Side melter. It was expected that an order for 2500 tons of Southern iron for an Iowa appliance manufacturer would be placed this week.

Uncertainties of the price situation and future business are believed to be responsible for the lack of buying at this time. Melters are reducing inventories, and a heavy demand for quick shipment is expected to follow any marked revival in demand for finished products. Shipments of the local maker are fairly good, although slightly less than at this time a year ago.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.....	\$19.00
Malleable, f.o.b. Granite City.....	19.00
N'th'n No. 2 fdy., deliv'd St. Louis.....	21.16
Southern No. 2 fdy., deliv'd.....	17.42
Northern malleable, deliv'd.....	21.16
Northern basic, deliv'd.....	21.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel.—A spotty demand for steel products is reported by the Granite City Steel Co. The demand for galvanized sheets is extremely light, and, while orders for black sheets are better, they do not represent any great volume. The general demand for blue annealed sheets and blue annealed light plates is fair. Incoming plate business, which has been lean in the last few weeks, appears to be picking up, and a number of projects are contemplated which should amount to a considerable tonnage. Specifications for tin plate are encouraging, and, while shipments in May will be light, incoming business

thus far this month indicates the company will have good operations during June. Price shading is reported.

Old Material.—The market for old material continues weak, although prices being paid by dealers are unchanged. A leading melter is said to be endeavoring to buy selected heavy melting steel from dealers at \$12 a ton, but without success. Dealers are about cleaned up on orders, and may begin to lay down material in their yards.

Railroad lists include: Chicago, Burlington & Quincy, 3720 tons; Chicago & Alton, 1470 tons; Chicago, Milwaukee, St. Paul & Pacific, 64 carloads and Chicago, Great Western, eight carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$11.50 to \$12.00
No. 1 heavy melting or shoveling steel.....	11.00 to 11.50
No. 2 heavy melting or shoveling steel.....	10.25 to 10.75
No. 1 locomotive tires.....	14.00 to 14.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart.....	11.50 to 12.00
Railroad springs.....	13.75 to 14.25
Bundled sheets.....	8.00 to 8.50
No. 2 railroad wrought.....	11.00 to 11.50
No. 1 busheling.....	9.75 to 10.25
Cast iron borings and shoveling turnings.....	9.25 to 9.75
Iron rails.....	11.00 to 11.50
Rails for rolling.....	12.50 to 13.00
Machine shop turnings.....	6.75 to 7.25
Heavy turnings.....	9.00 to 9.50
Steel car axles.....	16.00 to 16.50
Iron car axles.....	25.50 to 26.00
Wrot. iron bars and trans.....	18.00 to 18.50
No. 1 railroad wrought.....	10.00 to 10.50
Steel rails, less than 3 ft.....	14.00 to 14.50
Steel angle bars.....	11.50 to 12.00
Cast iron carwheels.....	13.50 to 14.00
No. 1 machinery cast.....	13.50 to 14.00
Railroad malleable.....	13.25 to 13.75
No. 1 railroad cast.....	11.50 to 12.00
Stove plate.....	10.00 to 10.50
Relay. rails, 60 lb. and under.....	20.50 to 23.50
Relay. rails, 70 lb. and over.....	26.50 to 29.00
Agricult. malleable.....	12.00 to 12.50

CINCINNATI

Pig Iron Melters Closely Restricting Purchases—Some Scrap Grades Off 25c.

CINCINNATI, May 20.—District consumers of pig iron are continuing their policy of buying only as the need arises. The week's sales were about 3000 tons, of which 1000 tons in small lots went to Southern furnaces. While the demand for Southern iron at \$13, base Birmingham, continues to be meager, district representatives indicate that no quotations under this figure have been made, since no substantial tonnages have come out to test the price structure. Except for the sale of 200 tons of Northern foundry iron to a Springfield, Ohio, consumer, all orders were for small quantities, ranging from a single car to 100 tons. The

only inquiry before the trade is from Central Indiana for 300 to 500 tons of both malleable and foundry iron.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25.....	\$20.89 to \$21.39
Ala. fdy., sil. 1.75 to 2.25.....	16.69 to 17.69
Ala. fdy., sil. 2.25 to 2.75.....	17.19 to 18.19
Tenn. fdy., sil. 1.75 to 2.25.....	17.19 to 17.69
S'th'n Ohio silvery, 8 per cent.....	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Steel.—The leading sheet interest states that there is no change in the sheet steel market. Production and demand continue on a parity at about 50 to 60 per cent of capacity.

No change has been noted in the demand from the various sheet consuming fields. Automobile manufacturers especially are holding specifications to actual needs. District structural fabricators report that business is dull.

Old Material.—With the supply of good scrap a little easier and consumers restricting purchases and specifications, district scrap dealers have reduced their bids 25c. on heavy melting steel, No. 2 wrought, scrap rails for melting and bundled sheets.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$11.00 to \$11.50
Scrap rails for melting....	12.25 to 12.75
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets	10.00 to 10.50
Cast iron borings.....	8.00 to 8.50
Machine shop turnings....	7.50 to 8.00
No. 1 busheling	9.50 to 10.00
No. 2 busheling	6.00 to 6.50
Rails for rolling.....	13.00 to 13.50
No. 1 locomotive tires....	13.50 to 14.00
No. 2 railroad wrought....	11.00 to 11.50
Short rails	17.50 to 18.00
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	17.50 to 18.00
No. 1 railroad cast.....	14.50 to 15.00
Burnt cast	8.25 to 8.75
Stove plate	8.25 to 8.75
Brake shoes	8.25 to 8.75
Agricultural malleable....	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Detroit Scrap Still Weak

DETROIT, May 20.—During the past week the market on old material in the district has shown a little further weakness.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$11.25 to \$11.75
Borings and short turnings	7.50 to 8.00
Long turnings	7.00 to 7.50
No. 1 machinery cast.....	11.25 to 11.75
Automotive cast	13.50 to 14.00
Hydraul. comp. sheets....	10.75 to 11.25
Stove plate	9.00 to 9.50
New No. 1 busheling.....	10.00 to 10.50
Old No. 1 busheling	8.75 to 9.25
Sheet clippings.....	8.25 to 8.75
Flashings	10.00 to 10.50

Warehouse Prices, f.o.b. Boston

Base per Lb.	
Plates	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined.....	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	*3.55c. to 5.55c.
Squares and flats.....	*4.05c. to 7.05c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts.....	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts.....	50 and 5
Cold-punched nuts.....	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

BOSTON

Pig Iron Dull in a Weak Market—Scrap Also Quiet and Soft

BOSTON, May 20.—Another dull week was experienced in the pig iron market, sales not aggregating 2000 tons. Buffalo furnaces are holding to \$16 a ton, base Buffalo, but the 50c. a ton differential is not always maintained on No. 2X iron. Furnaces east of Buffalo are taking business at delivered prices equivalent to \$16 a ton, Buffalo, when there is no competition, and when pressed by competitors are shading the market. Indian iron prices have been reduced, recent sales of No. 2X having been made at \$20.75 to \$21 a ton, on dock here, duty paid, contrasted with \$21.50 and \$22 a ton in April. Indications are that third quarter iron buying will start later than anticipated.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25..	\$20.28 to \$21.28
†Buffalo, sil. 2.25 to 2.75..	20.78 to 21.78
*Buffalo, sil. 1.75 to 2.25..	20.91 to 21.91
*Buffalo, sil. 2.25 to 2.75..	21.41 to 22.41
Va., sil. 1.75 to 2.25.....	25.21
Va., sil. 2.25 to 2.75.....	25.71
*Ala., sil. 1.75 to 2.25.....	22.61
*Ala., sil. 2.25 to 2.75.....	23.11
†Ala., sil. 1.75 to 2.25.....	18.75
†Ala., sil. 2.25 to 2.75.....	19.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe.—Business remains quiet and confined to occasional car lots. Massachusetts will open bids May 29 on 2500 tons of 12, 16, 24 and 60-in. pipe and 185 tons of special fittings, the bulk being 16-in., and Lowell, Mass., May 22, on 110 tons. Malden, Mass., has closed bids on 170 tons, but will not make an award until late this week. Openly quoted prices on domestic pipe are \$36 to \$38 a ton, base foundry, but \$1 to \$2 concessions can be obtained on attractive tonnages. Foreign pipe is offered at prices considerably under those for domestic.

Warehouse Business.—Machine bolts, carriage bolts and lag screws have been reduced 10 per cent, now being quoted 60 and 5 per cent off list. The movement of steel products out of warehouses continues to lag behind that of a year ago, but it is about 10 per cent better than a month ago.

Reinforcing Bars.—About 1200 tons of billet steel bars was sold here in the past week, including 400 tons for a Lynn, Mass., high school, 200 tons for a Lexington, Mass., hospital addition, 180 tons for a Pittsfield, Mass., telephone exchange, 108 tons for a Harvard College athletic building, 100 tons for a local State office building and the remainder in small lots. Quite a few jobs are being figured, all of them small. Billet steel bars from

local stock are: 1 to 5-ton lots, 3.06½c. a lb., base; 5 to 99-ton lots, 2.56½c., 100-ton and larger lots, 2.46½c.

Old Material.—A steamer is loading 1300 to 1400 tons of rails here for export to Japan. The Roxbury Iron & Metal Co. has purchased 3000 to 3900 tons of steel scrap from the Boston Terminal Co., which is wrecking the South Station train shed. The Hyman-Michaels Co., New York, has purchased 14 miles of Berkshire Street Railway Co. trackage between Williamstown, Mass., and Bennington, Vt. Otherwise, there is little doing in the scrap market, purchases by local dealers being confined to scattered car lots for Pennsylvania steel mills. Scrap rail and chemical borings prices are holding well, but most other kinds of material are weak and lower than a week ago. The general range of prices on chemical borings is \$9 to \$9.50 a ton, on cars shipping point, but one buyer has been paying \$9.60. A sale of shafting was made at \$14.50 to \$15 a ton, on cars shipping point, but the current market appears to be \$12.50 to \$13. Bundled forge scrap is mostly \$7 to \$7.50 a ton, and shoveling \$7.50 to \$8.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$8.75 to \$9.25
Scrap T rails.....	8.75 to 9.25
Scrap girder rails.....	8.00 to 8.50
No. 1 railroad wrought....	9.50 to 10.00
Machine shop turnings....	4.50 to 5.00
Cast iron borings (steel works and rolling mill)	4.50 to 5.00
Bundled skeleton, long....	7.00 to 7.50
Forge flashings.....	8.00 to 8.25
Blast furnace borings and turnings	4.50 to 4.75
Forge scrap.....	7.00 to 8.00
Shafting	12.50 to 13.00
Steel car axles.....	15.50 to 16.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	7.75 to 8.00
Rails for rolling.....	9.50 to 10.00
Cast iron borings, chemical	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$12.00 to \$12.50
No. 1 machinery cast.....	14.50 to 15.00
No. 2 machinery cast.....	13.50 to 14.00
Stove plate.....	10.00 to 10.50
Railroad malleable	15.50 to 16.00

An order for a casting of unusual size has been received by the foundry department of the Otis Steel Co., Cleveland. The casting will weigh 230,000 lb. and will be an anvil base for a 12,000-lb. hammer being manufactured by the Alliance Machine Co., Alliance, Ohio, for the Taylor Forge & Iron Co., Chicago. The casting will be 13 ft. long and nearly 7 ft. high. Its production will require nine weeks.

Brainard Steel Corporation, Warren, Ohio, maker of strip steel, has opened a branch sales office at 3701 North Broad Street, Philadelphia, in charge of H. Clinton Hanline.

BUFFALO Lackawanna Plant Steps Up Steel Operations Slightly—Larger Scrap Buying

BUFFALO, May 20.—The character of the pig iron market is unchanged. The larger buyers are not coming into the market with sizable inquiries, purchasing only for current needs. No inquiries for much more than 100 tons are reported, and it is probable that 4000 tons would cover the entire commitment of all local furnaces over the past week. Shipments against old contracts are holding up, and considerable of this iron is going east by way of the barge canal. Operations are unchanged.

Prices per gross ton f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$18.50
No. 2X fdy., sil. 2.25 to 2.75.....	19.00
No. 1 fdy., sil. 2.75 to 3.25.....	20.00
Malleable, sil. up to 2.25.....	19.00
Basic.....	17.50
Lake Superior charcoal.....	27.28

Finished Steel.—Operations of Buffalo mills are slightly improved. The Lackawanna plant of the Bethlehem Steel Co. is operating 21 open-hearths as against 19 last week. Most of its mills are on double turn. Other plants show no change. Fabricated structural steel work shows some gains. Erie County will build a bridge at Irving, N. Y., which will require 1000 tons.

Old Material.—The two largest consumers came into the market during the past week, one purchasing a small tonnage while the other took a fairly large tonnage. The larger tonnage was taken by the dealers at \$13.75 for No. 1 heavy melting steel and \$12.25 for the No. 2 grade. Prices on the other purchase were \$14.50 for No. 1 heavy melting steel and \$13.50 for No. 1 busheling. Dealers are paying \$11.75 for No. 2 steel and \$13.25 for No. 1 steel against the larger order. Dealers who took the smaller order

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.20
Black wire, base per 100 lb.....	3.50

are reported to be covered. Other sales are at a minimum.

Prices per gross ton f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$13.75 to \$14.50
No. 2 heavy melting scrap.....	12.25
Scrap rails.....	14.00 to 15.00
Hydraulic comp. sheets.....	12.25
Hand bundled sheets.....	10.00 to 10.50
Drop forge flashings.....	12.25
No. 1 busheling.....	12.25 to 13.50
Hvy. steel axle turnings.....	13.00 to 13.50
Machine shop turnings.....	8.00 to 8.50
No. 1 railroad wrought.....	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers.....	16.50 to 17.00
Coil and leaf springs.....	16.50 to 17.00
Rolled steel wheels.....	16.50 to 17.00
Low phos. billet and bloom ends.....	17.50 to 18.00
Electric Furnace Grades:	
Short shov. steel turnings.....	11.50 to 11.75
Blast Furnace Grades:	
Short mixed borings and turnings.....	10.25 to 10.75
Cast iron borings.....	10.25 to 10.75
No. 2 busheling.....	8.00
Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.00
Iron axles.....	19.50 to 20.00
Cupola Grades:	
No. 1 machinery cast.....	12.50 to 13.00
Stove plate.....	11.50 to 12.00
Locomotive grate bars.....	10.00 to 10.50
Steel rails, 3 ft. and under.....	16.50 to 17.00
Cast iron car wheels.....	11.50 to 12.00
Malleable Grades:	
Industrial.....	16.00 to 16.50
Railroad.....	16.00 to 16.50
Agricultural.....	16.00 to 16.50
Special Grades:	
Chemical borings.....	11.50 to 12.00

phur in a hard spring steel. It would probably be very dangerous, and, lacking direct proof, no one would be justified in arguing for a change in spring steel specifications on the basis of research on rivet steel.

"Such research as that on permissible sulphur in rivet steel is very expensive. It has to be done under auspices admittedly free from any suspicion of bias, and by slow, unwieldy group action, in order to be accepted. Before there is any hope of widening the sulphur range in spring steel, someone will have to finance that phase of the work on sulphur and phosphorus.

"The deliberations of any specification-making committee almost invariably show the need for research. Much research is carried out by committee members for their committee work. Too seldom, however, is it possible to finance research of the scope and nature needed.

"Producers who are hampered by unintelligent specifications, whose evils Dr. Johnston has so well indi-

cated, have just one remedy. That is to supply the information needed by research, not only in their own plants (for that may be passed by as biased until it has been checked by several competitors), but also through technical societies and detached, impartial institutions."

Great Lakes Steel Plant to Be Ready Aug. 1

The Great Lakes Steel Corporation, a unit of the National Steel Corporation, has completed the installation of four large cranes at its new mill at Detroit. A 200-ton Morgan ladle crane has been installed in the open-hearth building, with a 125-ton hot metal crane just completed in the same building. Two smaller cranes, one of 50-ton capacity and the other of 20-ton capacity, have been installed at the blooming mill.

Completion of the construction of the Great Lakes plant is scheduled for Aug. 1.

Republic's New Pipe Plant Near Completion

Large scale production of electric welded pipe will be started by the Republic Steel Corporation at its new pipe mill at Youngstown within the next few weeks, it is announced by T. M. Girdler, chairman of the board of the company. Completion of the mill is being rushed and all of the important equipment is in place with the exception of two large machines which are expected to be installed by the end of this month.

Inquiries for the company's pipe to be produced under the Johnston patents, controlled by the Republic Steel Corporation, have been extremely heavy, according to Chairman Girdler, and large bookings are assured as soon as delivery dates can be definitely fixed. The large present stimulation in demand for pipe is coming partly from the development taking place in the construction of natural gas pipe lines.

With the completion of the new production unit, Republic will have two mills for the making of small pipe from 2 to 8-in. in diameter, and one mill for the making of pipe from 8 to 16 in. The total capacity of the mills will approximate 30,000 tons monthly.

Whiting Corporation Expands in South

The Whiting Corporation, Harvey, Ill., has acquired a substantial control in the Goslin-Birmingham Mfg. Co., Birmingham, and a working agreement has been made whereby the former company will make several lines of its equipment at Birmingham for the Southeastern territory. Some new machinery will be installed for the manufacture of Whiting cranes and other equipment.

Chemistry of Steel Is Unduly Emphasized

(Concluded from page 1537)

the properties one really wishes to measure. In chilled iron car wheels, a thermal test and a drop test to reveal fragility are imposed, and chemical composition is also required. But here what is wanted, besides freedom from fragility, is wear resistance. As there is as yet no simple, reliable test accepted for wear resistance, all that can be done is to fall back on indirect methods and specify something the user is not really interested in, because, in his experience, satisfactory wear resistance has accompanied the composition demanded.

"Even when we have knowledge, such as that cited by Dr. Johnston on permissible sulphur in rivet steel, we cannot safely extrapolate too far. Because a soft rivet steel is tolerant of manganese sulphide is not a good argument for permitting high sul-

Non-Ferrous Metal Markets

Copper Quiet and Firm—Tin at New Low—Lead Reduced—Zinc Inactive

NEW YORK, May 20.

Copper.—Demand has quieted considerably following the heavy sales up to about a week ago. This is especially true of the domestic market. Sales for export, however, keep up remarkably well, the total for yesterday having been over 6000 gross tons and about 2500 tons for the first half of today. Foreign buyers have purchased thus far this month about 82,000 tons, which compares with 91,000 tons for all of May, 1929, which was a record month. Consumers abroad are attempting to buy all the metal they can at present levels, the quotation standing at 13.30c. c.i.f. usual European ports, as established by Copper Exporters, Inc. Some large primary producers have sold as much metal at the present level for domestic consumption as they care to sell at the present price, but copper is still available from custom smelters. Fabricators here have disposed of most of their finished products and, while their order books are in fair condition, they are also filling in stocks of standard products.

Generally speaking, sentiment is excellent, and there is very little talk or prospect of lower prices, with some hints that the market will ultimately go higher. During the heavy sales about a week ago, reliable estimates placed the total for domestic and foreign consumers at 550,000,000 lb.

Electrolytic copper is quoted very firm at 13c., delivered in the Connecticut Valley, with Lake copper at 13c. to 13.12½c., delivered. Lake producers, some of them at least, are selling only their output and holding their stocks, and report a good demand.

Tin.—Spot Straits tin sold today at 31.37½c., New York, the lowest since July 17, 1922, when the quotation was 31.12½c. A fair business was done today in a quiet market. During most of the week there has been very little demand and quotations have been gradually sliding to new low levels. In London today new low prices were recorded, with spot standard quoted at £141 15s., future standard, at £143 12s. 6d., and spot Straits, at £143 15s. per ton. The Singapore market today was £146 5s.

Several causes for the lower levels may be noted: Stocks in London warehouses at the end of last week, May 17, had increased 108 tons to 18,701 tons; stocks of tin on the dock

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	May 20	May 19	May 17	May 16	May 15	May 14
Lake copper, New York.....	13.12½	13.12½	13.12½	13.12½	13.12½	13.12½
Electrolytic copper, N. Y.*.....	12.75	12.75	12.75	12.75	12.75	12.75
Straits tin, spot, N. Y.	31.37½	31.62½	....	31.87½	32.37½	33.12½
Zinc, East St. Louis.....	4.62½	4.60	4.60	4.60	4.60	4.60
Zinc, New York.....	4.97½	4.95	4.95	4.95	4.95	4.95
Lead, St. Louis.....	5.45	5.45	5.45	5.45	5.45	5.50
Lead, New York.....	5.60	5.60	5.60	5.60	5.60	5.60

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	19.75c.
Copper, hot rolled.....	22.75c.
Zinc	10.00c.
Lead (full sheets).....	8.25c.
Seamless Tubes—	
High brass	24.75c.
Copper	25.00c.
Rods—	
High brass	18.75c.
Naval brass	21.50c.
Wire—	
Copper	14.87½c.
High brass	20.25c.
Copper in Rolls.....	21.75c.
Brazed Brass Tubing.....	27.25c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	31.30c.
Tubes, base.....	42.00c.
Rolled rods in coils.....	31.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—		Base per Lb.
High brass	19.25c.	
Copper, hot rolled.....	22.25c.	
Copper, cold rolled, 14 oz. and heavier	24.50c.	
Zinc	10.00c.	
Lead, wide	10.05c.	
Seamless Tubes—		
Brass	24.25c.	
Copper	24.50c.	
Brass Rods	17.50c.	
Brazed Brass Tubes.....	26.75c.	

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	19.75c.
Copper, hot rolled, base sizes.....	22.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	25.00c.
Seamless Tubes—	
Brass	24.75c.
Copper	25.00c.
Brass Rods	18.00c.
Brazed Brass Tubes.....	27.25c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	10.25c. to 10.75c.
Zinc sheets, open.....	11.25c. to 11.75c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	34.50c. to 35.50c.
Tin, bar	36.50c. to 37.50c.
Copper, Lake	14.75c.
Copper, electrolytic	14.50c.
Copper, casting	14.25c.
Zinc, slab.....	6.25c. to 7.25c.
Lead, American pig.....	6.50c. to 7.00c.
Lead, bar.....	8.00c. to 8.50c.
Antimony, Asiatic	10.25c. to 10.75c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½.....	24.00c. to 25.00c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	36.50c.
Tin, bar	38.50c.
Copper, Lake	14.00c.
Copper, electrolytic	14.00c.
Copper, casting	13.75c.
Zinc, slab	7.00c. to 7.25c.
Lead, American pig.....	6.38c. to 6.63c.
Lead, bar.....	8.75c.
Antimony, Asiatic	14.00c.
Babbitt metal, medium grade.....	17.50c.
Babbitt metal, high grade.....	42.50c.
Solder, ½ and ½.....	23.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	10.25c.	11.75c.
Copper, hvy. and wire	10.00c.	11.25c.
Copper, light and bottoms	8.75c.	10.00c.
Brass, heavy	5.50c.	6.50c.
Brass, light.....	4.50c.	5.50c.
Hvy. machine composition	8.00c.	9.00c.
No. 1 yel. brass turnings	5.50c.	6.25c.
No. 1 red brass or compos. turnings...	7.50c.	8.50c.
Lead, heavy.....	4.00c.	4.62½c.
Lead, tea.....	3.00c.	3.50c.
Zinc	2.50c.	3.00c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	7.00c.	9.00c.

here are exceedingly large and remain unsold; spot tin is selling at about the same level as July delivery, and there is pressure to part with May-June metal. Because of these facts some predict even lower prices. Sentiment among consumers is bearish, and some of them are talking 30c. tin.

Other facts bearing on the situation are statements that imports of tin ore into the Straits Settlements for the first quarter of this year, as well as the production of ore there, are larger than for the same period in 1929. It is also stated that the production of tin by the Patino mines for the first quarter of this year is 250 tons larger than in the first quarter of last year.

Lead.—Because of unsettled conditions abroad and lower prices in London, the American Smelting & Refining Co. today reduced its contract price \$2 a ton or from 5.60c. to 5.50c. a lb., New York. Anticipating this, consumers have been inactive and demand has been confined to a few carload and small lots for prompt shipment. The leading producer in the West has reduced its price to 5.40c., St. Louis.

Zinc.—Prime Western zinc is slightly stronger at 4.62½c. to 4.65c., East St. Louis, or 4.97½c. to 5c., New York, but demand is still very light. Some producers will not sell below 4.65c. and some have done no business at the lower levels in the past two weeks. The future trend of the market is difficult to forecast.

The quotation for ore is unchanged at \$33, Joplin. The surplus is estimated at about 12,200 tons, with production for the week ended Saturday, May 17, at 9000 tons, with shipments at 10,170 tons and sales at 7720 tons.

Antimony.—Due to lack of demand, prices are lower at 7.40c. to 7.45c. a lb. for Chinese metal for all deliveries, duty paid, New York.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at the published price of 23.90c., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, May 20.—Announcement of lower prices has subsided. Quotations on lead are slightly higher under the influence of the foreign market. Transactions in old metals are in moderate volume.

Prices per lb., in carload lots: Lake copper, 13.25c.; tin, 32.50c.; lead, 5.55c.; zinc, 4.75c.; in less-than-carload lots, antimony, 8.60c. On old metals we quote copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 8c.; red brass, 8c.; yellow brass, 6c.; lead pipe, 4.25c.; zinc, 2c.; pewter, No. 1, 17.50c.; tin-foil, 20c.; block tin, 26.50c.; aluminum, 8.50c.; all being dealers' prices for less-than-carload lots.

Reinforcing Steel

Two Railroad Piers in New Jersey Require 6500 Tons

OF the 13,500 tons for new projects, 6500 tons will be required for piers for the Pennsylvania and Erie railroads at Jersey City, and 1800 tons for State road work at Springfield, Ill. Awards for the week totaled 8000 tons and include 3100 tons for highway work. Awards follow:

LYNN, MASS., 400 tons, high school, to Joseph T. Ryerson & Son, Inc.
 LEXINGTON, MASS., 200 tons, hospital addition, to Joseph T. Ryerson & Son, Inc.
 PITTSFIELD, MASS., 180 tons, telephone exchange, to unnamed bidder.
 CAMBRIDGE, MASS., 108 tons, Dillon field house, Harvard College, to Concrete Steel Co.
 BOSTON, 100 tons, State office building, to Joseph T. Ryerson & Son, Inc.
 NEW YORK, 800 tons, sections D and E, New York Telephone Co. building, Church and Lispenard Streets, to Carroll-McCreary Co.
 NEW YORK, 125 tons, sewer work in Bronx, to Concrete Steel Co.
 BROOKLYN, 500 tons, sewer work, Avenue Z, Brooklyn Department of Sewers, to Igoe Brothers.
 YONKERS, N. Y., 100 tons, bridge for Westchester County Park Commission, to Concrete Steel Co.
 WESTCHESTER COUNTY, N. Y., 500 tons, Bronx River Parkway extension, to Kalman Steel Co.
 NEW JERSEY, 350 tons, rail steel, State road work, route 30, section 8, to Concrete Steel Co.
 PHILADELPHIA, 700 tons, plant in West Philadelphia for Vogt Packing Co., to Kalman Steel Co.
 STATE OF INDIANA, 200 tons, State highway work, to an unnamed bidder.
 STATE OF WISCONSIN, 300 tons, State road work, to an unnamed bidder.
 STATE OF IOWA, 300 tons, highways, to an unnamed bidder.
 WAUKEGAN, ILL., 140 tons, Public Service Co., to Calumet Steel Co.; this is in addition to tonnage previously reported.
 SPRINGFIELD, ILL., 1100 tons, State highway work, to unnamed bidders.
 CHICAGO, 100 tons, garage, to Calumet Steel Co.
 OAK PARK, ILL., 120 tons, school, to Calumet Steel Co.
 STATE OF ILLINOIS, 300 tons, highway work and bridges, to Calumet Steel Co.
 MINNEAPOLIS, 100 tons, school, to Calumet Steel Co.
 SHEBOYGAN, WIS., 200 tons, Wisconsin Power & Light Co., to American System of Reinforcing.
 CHICAGO, 600 tons, warehouse for Commonwealth Edison Co., to an unnamed bidder.
 RACINE, WIS., 100 tons, Post Office, to Calumet Steel Co.
 LOS ANGELES COUNTY, CAL., 129 tons, Drainage System No. 29, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

QUEENS, NEW YORK, 790 tons, subway section 6, route 108; general contract awarded to Clemente Contracting Co., New York.
 JERSEY CITY, N. J., 4000 tons, pier for Pennsylvania Railroad; general contract bids to be taken May 22.

JERSEY CITY, N. J., 2500 tons, pier for Erie Railroad; general contract bids to be taken June 28.

NEW JERSEY, 150 tons, deck for Hackensack River bridge, Pennsylvania Railroad; general contract bids in.

PHILADELPHIA, 800 tons, plant for West Philadelphia Packing Co.; Turner Construction Co., general contractor.

BUFFALO, 100 tons; school No. 19.

TURTLE CREEK, PA., 1500 tons, bridge, Booth & Flinn Co., general contractor.

ROCKFORD, ILL., 175 tons, sewage disposal plant.

GALESBURG, ILL., 1200 tons, sewage disposal plant; O'Brien Brothers, general contractors.

CHICAGO, 750 tons, medical and dental building for University of Illinois.

SPRINGFIELD, ILL., 1800 tons, State road work; bids taken June 11.

LOS ANGELES, 420 tons, Sixth Street viaduct; bids June 11.

SEATTLE, 500 tons, Aurora Avenue bridge; bids June 24.

Railroad Equipment

Temiskaming & Northern Ontario has ordered four Consolidated type locomotives from Canadian Locomotive Co.

South Buffalo is inquiring for two eight-wheel switching locomotives.

Bangor & Aroostook has ordered three locomotives of 4-8-2 type from American Locomotive Co.

Peoria & Pekin Union has ordered two eight-wheel switching locomotives from Baldwin Locomotive Works.

Electro Metallurgical Co. of Canada has ordered one four-wheel connected tank locomotive from Montreal Locomotive Works, Ltd.

United Fruit Co. is inquiring for 25 flat cars and 15 fruit cars.

Gulf Refining Co. is inquiring for 250 tank cars, 40 tons capacity.

Erie is inquiring for three mail and express cars 70 ft. long.

Northwestern Pacific has ordered seven interurban cars and two trailers from St. Louis Car Co.

New York, New Haven & Hartford has ordered one club car from Standard Steel Car Co.

Illinois Central is inquiring for five baggage and express cars, five baggage and mail cars and five horse cars.

Newfoundland Railway has ordered one dining car and two sleeping cars from National Steel Car Corporation.

Lehigh Valley has ordered two gas-electric rail motor cars and one trailer car from Osgood Bradley Car Co.

Southern Pacific has ordered one lounge car and three observation cars from Pullman Car & Mfg. Corporation.

Chicago, Milwaukee, St. Paul & Pacific has ordered two dining cars from Pullman Car & Mfg. Corporation.

Minneapolis & St. Louis has ordered four gas-electric rail motor cars from St. Louis Car Co.

Milwaukee Plant Gets Large Gas Pipe Order

A. O. Smith Corporation, Milwaukee, announced May 15, that it had received an order for 115 miles of 16-in. electrically welded steel pipe for the extension of the pipe line of the Southern Natural Gas Corporation from its present terminus at Yazoo City, Miss., to Mobile, Ala.

Fabricated Structural Steel

Awards of 51,000 Tons Largest Since February—New Projects of 30,000 Tons Smaller Than Previous Week

STRUCTURAL steel awards continue to gain, having reached a total of about 51,000 tons in the past week, compared with 43,000 tons the week before. More than half this total is in a 20,000-ton office building in New York and a 7500-ton bridge for the Atchison, Topeka & Santa Fe at Chilli-cothe, Ill.

New projects totaling about 30,000 tons included 8000 tons for railroad pier sheds in New York, 5000 tons for a highway bridge at Dallas, Tex., and 4500 tons for a department store addition in New York. Awards follow:

RUMFORD, ME., 1000 tons, Oxford Paper Co. mill, to New England Structural Co.
INDIAN ORCHARD, MASS., 265 tons, foundry and valve shop addition, to Haarrman Steel Co.

QUINCY, MASS., 112 tons, high school, to Grosier & Slager.

NEW YORK, 20,000 tons, office building at Pine and Wall Streets for Henry L. Doherty & Co., to Taylor-Fichter Steel Construction Co.

NEW YORK, 950 tons, school No. 151 in Queens, to Easton Structural Steel Co.

NEW YORK, 275 tons, office building and art gallery, 23 West Forty-seventh Street, to Easton Structural Steel Co.

NEW YORK, 4300 tons, office building at 78 Broad Street, to McClintic-Marshall Co.

STATE OF NEW YORK, 200 tons, highway bridges, to American Bridge Co.

NEW YORK CENTRAL RAILROAD, 200 tons, grade crossing elimination at Marcy, N. Y., to American Bridge Co.

NORRISTOWN, PA., 500 tons, theater for Norris Amusement Co., to Norris Iron & Wire Works, Bridgeport, Pa.

TOLEDO, 1400 tons, Devilbiss School, to Massillon Bridge & Structural Co.; previously reported to an unnamed bidder.

MUSKEGON, MICH., 300 tons, warehouse and factory for Warner Brothers, to Flint Structural Steel Co.

GENESEE COUNTY, N. Y., 190 tons, New York State bridge, to Kellogg Structural Steel Co.

PITTSFORD, N. Y., 150 tons, grade crossing elimination, to McClintic-Marshall Co.

AUBURN, N. Y., 150 tons, grade crossing elimination, to McClintic-Marshall Co.

MONACA, PA., 2000 tons, plant building for St. Joseph Lead Co., to Jones & Laughlin Steel Corporation.

CINCINNATI, 625 tons, grade separation work at Beechmont Avenue and Hutton Street, to American Bridge Co.

CLEVELAND, 1200 tons, warehouse for General Electric Realty Corporation, to American Bridge Co.

STATE OF OHIO, 200 tons, Gallia County highway bridge, to American Bridge Co.

PIQUA, OHIO, 450 tons, building for Val Decker Packing Co., to Dayton Structural Steel Co.

YOUNGSTOWN, 250 tons, Republic Steel Corporation, to Ingalls Iron Works, Pittsburgh plant.

HARTSVILLE, TENN., 400 tons, State highway bridge, to Virginia Bridge & Iron Co.

CHICAGO, 1200 tons, substation for Commonwealth Edison Co., to McClintic-Marshall Co.

CHICAGO, 210 tons, bridge across Calumet River, to Gage Structural Steel Co.

NORTH CHICAGO, ILL., 120 tons, building for United States Veterans' Bureau, to an unnamed bidder.

MILWAUKEE, 1000 tons, research laboratory for A. O. Smith Corporation, to Wisconsin Bridge & Iron Co.

SHEBOYGAN, WIS., 1150 tons, power house for Wisconsin Power & Light Co.; 200

tons to Wisconsin Bridge & Iron Co. and 950 tons to Milwaukee Bridge Co.

ATCHISON, TOPEKA & SANTA FE, 7500 tons, bridge across Illinois River at Chilli-cothe, Ill., to McClintic-Marshall Co.

ST. LOUIS-SAN FRANCISCO RAILROAD, 650 tons, bridges, to American Bridge Co., and Mississippi Valley Structural Steel Co.

KANSAS CITY, MO., 6000 tons, office building for Kansas City Power & Light Co., to Kansas City Structural Steel Co.; previously reported to an unnamed bidder.

CLARENDON, ARK., 4900 tons, highway bridge across White River, to Austin Bridge Co.; fabricated work sublet to Virginia Bridge & Iron Co.

EVERETT, WASH., 100 tons, two steel tanks, to Seattle Boiler Works.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

NEWTON, MASS., 500 tons, high school.

PROVIDENCE, R. I., 200 tons, chain store building.

NEW BEDFORD, MASS., 178 tons, stores.

WEST STEWARTSTOWN, N. H., 120 tons, State bridge.

BERLIN, N. H., 100 tons, string manufacturing plant.

NEW YORK, 1600 tons, apartment hotel, Eighth Avenue and Twenty-third Street.
NEW YORK, 500 tons, Murray Hill-Guggenheim Dental Clinic, East Seventy-second Street.

NEW YORK, 4500 tons, addition to department store of R. H. Macy & Co.

NEW YORK, unstated tonnage, addition to school No. 73 in Queens.

STATE OF NEW YORK, 400 tons, highway bridges.

NEW YORK, 500 tons, garage at 152 East Eighty-seventh Street.

NEW YORK, 300 tons, apartment building at 216 East Fifty-sixth Street.

NEW YORK, 150 tons, office building at 45 East Thirty-third Street.

NEW YORK CENTRAL RAILROAD, 500 tons, viaduct at Sixty-fifth Street, New York.

BROOKLYN, 2000 tons, Federal Court and Post Office building.

SOUTH AMBOY, N. J., unstated tonnage, repeater station for New Jersey Telephone Co.

JERSEY CITY, N. J., 8000 tons, pier sheds, 4500 tons for Pennsylvania Railroad and 3500 tons for Erie Railroad.

STATE OF PENNSYLVANIA, 1350 tons, highway bridges, including 1000 tons in Northampton County.

IRVING, N. Y., 1000 tons, County bridge.

SPARROWS POINT, MD., 100 tons, emergency hospital for Bethlehem Steel Co.

MIDVALE, PA., unstated tonnage, laboratory building for Midvale Co.

PHILADELPHIA, 100 tons, St. Agnes Hospital, Broad and Mifflin Streets.

PHILADELPHIA, unstated tonnage, apartment building at 4313 Walnut Street.

HAMBURG, PA., 100 tons, tuberculosis sanitarium.

ITHACA, N. Y., unstated tonnage, Myron Taylor Hall of Cornell University law school.

STATE OF PENNSYLVANIA, 455 tons, bridges including route 20, 315 tons and route 239, 145 tons; Eastern Engineering Co., Atlantic City, N. J., low bidder on general contract.

FINDLAY, OHIO, tonnage unstated, water purification and pumping station.

CLEVELAND, tonnage unstated, addition for Fisher Body Corporation.

DALLAS, TEX., 5000 tons, highway bridge; Austin Bridge Co., low bidder.

SOUTH CHICAGO, 350 tons, soaking pit building for Wisconsin Steel Co.

CHICAGO & ALTON, 300 tons, viaduct at Crawford Avenue, Chicago.

FAIRMONT, MINN., 300 tons, building for Fairmont Railway Motors, Inc.

WISCONSIN RAPIDS, WIS., 125 tons, high school.

SIoux FALLS, S. D., 750 tons, viaduct.

EAGLE, IDAHO, 450 tons, bridge across Boyes River.

SEATTLE, 7500 tons, Aurora Avenue bridge; bids June 24.

OAKLAND, CAL., 300 tons, Salvation Army building; bids being taken.

Automobile Output Gained 10 Per Cent in April

WASHINGTON, May 20.—Motor vehicle production in the United States in April rose to 442,630 units from 401,382 in March, according to the Department of Commerce. The output in April was the largest since last August, with a total of 498,628.

Increases in April were made both in passenger car and truck production. Passenger cars produced totaled 374,606, as against 335,789 in March. The output of trucks in April was 67,459, as compared with 64,204. Taxicab production declined to 565 from 1389.

For the four months of 1930, motor vehicle production in the United States was 1,466,590, of which 1,243,269 were passenger cars and 219,773 were trucks.

Canadian motor vehicle production in April totaled 24,257, the largest since last May, with a total of 31,559. The March output was 20,730. Of the Canadian output in April, 20,872 were passenger cars and 3385 were trucks. For the first four months of the current year, Canadian production totaled 70,923 motor vehicles, of which 59,914 were passenger cars and 11,009 were trucks.

Merger of Three Steel Foundry Companies

The Continental Roll & Steel Foundries, Inc., is the name of the new company which has been formed by the merger of the Duquesne Steel Foundry Co., Coraopolis, Pa.; the Wheeling Mold & Foundry Co., Wheeling, W. Va., and the Hubbard Steel Foundries Co., East Chicago, Ind. Formal organization of the new company will be completed before June 1. Headquarters will be at Chicago for the time being.

Japan and Sweden Expand Exports of Tubes

HAMBURG, GERMANY, May 5.—Exporters of tubes in Germany are encountering increasing competition from the product of Swedish and Japanese mills. Japan is offering black and galvanized gas tubing in China at prices considerably less than the quotations fixed by the International Tube Cartel, and Swedish mills have been selling boiler and other tubes for export at less than the cartel prices. Recently a Swedish interest obtained an order from the Indian Government at about 6 per cent lower price than the cartel members quoted. Neither Japan nor Sweden is a member of the International Tube Cartel, as at the time of its formation neither country exported tubes except in special cases.

Japan Developing Export Markets

YOKOHAMA, JAPAN, April 26.—Japanese steel products are becoming established in certain foreign markets. Inquiries have recently been received by Japanese mills from Egypt for about 7000 metric tons of 35-lb., rails, 6000 metric tons 75-lb. rails and about 2000 aluminum sheets.

German Metal Industry Dismisses 15,600

HAMBURG, GERMANY, May 5.—Since the first of this year the German iron, steel, hardware, non-ferrous and machinery industries have dismissed a total of 15,600 workmen, necessitated by decreased operations resulting from depression in business. The largest dismissals were in April.

To Electrify Guadeloupe

HAMBURG, GERMANY, May 5.—The Brown Boveri A. G., the German subsidiary of the Brown Boveri Co. of Switzerland, has received a contract for complete electrification of the island of Guadeloupe in the French West Indies. Construction has already begun on a steam power generating plant and a network of cables throughout the island.

Further Drop in Wholesale Commodity Prices

Index numbers of wholesale prices in April are reported by the United States Bureau of Labor Statistics at 90.7, compared with 90.8 in March. The decline has been continuous for several months but now seems to be slackening. Several of the groups of items went against the general trend—farm products, foods, fuels and the miscellaneous group all having registered increases.

Declines in the other groups were mainly fractional except for metals

and metal products, which went down to 98.8, compared with 100.6 in March. Iron and steel and non-ferrous metals both showed sharp drops, whereas agricultural implements, automobiles and other metal products registered no change from March.

Metal products are now 7.15 per cent lower than they were a year ago, this decline having been participated in by all five of the sub-groups. Iron and steel went down from 98.2 to 93.8; non-ferrous metals, from 113.1 to 90.5; automobiles, from 112.2 to 106.8; agricultural implements, from 98.8 to 95, and other metal products, from 98.5 to 98.4. All figures refer to 100 as the 1926 average.

Steel Plant for Chile

ESSEN, GERMANY, May 6.—The Friedrich Krupp A. G. is negotiating with the Government of Chile for the construction of a steel plant and blast furnace at Puerto Corral. Reports that the contract has been awarded cannot be confirmed.

Handling of Heavy Materials

(Concluded from page 1520)

motion, steam pipe and many other parts are machined, is so arranged that each bay feeds its product into the erecting shop in a position as nearly as possible opposite that in which it will be needed on the locomotive assembly. In the assembly shop itself reliance is placed mostly upon overhead cranes. This shop is full of railroad tracks running from end to end and has within it a feature which exists also in the tender shop, in the shape of trackage of all the different gages for which locomotives are built by the company. These range from 24 in. up to 5 ft. 6 in.

For handling locomotive boilers, or assemblies not yet on the wheels, there are cranes in this shop of 150-ton capacity. Special cradle beams for the rear end are provided, the front end being raised by means of a steel wire cable sling passed around the front end of the boiler itself. The cradle beams take two forms: one having I-beams from the lower to the upper member, while the other has wire rope slings. In both cases, however, the lower beam taking the load passes under the rear of the locomotive frame, beneath the cab.

Variety and Versatility in Handling Units

SOMETHING of the extent of the equipment used for handling materials may be visualized from the fact that the number of cranes was figured recently at 337; over 600 jib cranes are used, one of which is a traveling jib; there are five standard-gage yard locomotives in use, one being oil-electric; several narrow-gage engines, one electric serving pattern shop and pattern storage, a

American Alloy Scrap Imports Increasing

HAMBURG, GERMANY, May 5.—Dealers in alloy steel scrap have recently been receiving substantial inquiries for material from the United States, especially dealers in and consumers of tungsten bearing metals. Since the beginning of this year German dealers have shipped several hundred tons of alloy steel scrap to the United States.

Japan to Increase Tin Plate Output

YOKOHAMA, JAPAN, April 26.—Consumers of tin plate report a steady improvement in the quality of the Imperial Steel Works' product, and with demand increasing, the Government works is planning installation of an additional roll stand for black plate bringing the total to seven. This will add about 300 metric tons of tin plate to the output of the plant.

number of Fordson tractors, 19 motor trucks and 10 locomotive cranes, etc.; while there are from 2000 to 2500 tote boxes of various descriptions and sizes and over 2500 lifting slings and rigs. Magnets are used extensively for loading and unloading cars.

All castings, forgings and material to be processed, coming from outside plants, are unloaded at a central point, where they are sorted into special bays alongside the incoming track. These bays are marked out on the concrete floor in broad bands of yellow paint and each separate marked bay has a standard on the floor with a disk designating the department in which material is to be used.

This avoids confusion and misplacing of material. Each delivery bay is the width of the shop crane bay. Over this whole end of the shop and running parallel to the incoming railroad track is a high-level crane spanning all the bays, while projecting at right angles into the area served by this crane are the lower crane runways serving the individual bays.

Disposal of scrap from the various operations is worked out in rational manner. It is placed, as it accumulates, in large boxes properly designated as to character of scrap or rubbish, or what not. When enough accumulation has been made of any type to fill a railroad car, a car is brought in and the boxes are dumped. Meantime, the large boxes designed as receiving stations for this outgoing material are being gradually filled by use of smaller collecting boxes handled and dumped by the cranes as needed.

India Boycotting British Steel

Merchants Seek Government Aid As Many Contracts Are Cancelled—
Continental and British Mills Curtail Operations

(By Cable)

LONDON, ENGLAND, May 19.

A FACTOR in the present business depression and one causing growing anxiety is the political situation in India, where British goods are being boycotted severely and many contracts cancelled.

British merchants and manufacturers have suffered grave losses from cancellations and the Manchester Chamber of Commerce is urging the Government to come to the assistance of British merchants by affording full protection, but it is difficult to see what effective steps can be taken. The Indian boycott largely affects galvanized sheets and general merchant iron and steel.

A feature of the week is continued restriction of output here and on the Continent. In the United Kingdom further blast furnaces have suspended until only 34 are operating in the Cleveland district and additional stoppages are expected.

In Belgium four furnaces are being blown out. Certain steel mills in Belgium are closing for two days a week. These facts serve as an example of the drift of trade in Europe, where growing unemployment testifies to adverse economic conditions.

Certain large United Kingdom plants are starting the week's work on Tuesdays chiefly because of lack of shipbuilding specifications. Shipyards, which are closing include the Wear yard of William Gray & Co., Ltd., West Hartlepool, and the Dumbarton yard of Archibald McMillan & Son, one of the oldest on the Clyde.

European and British Mills
Reduce Output as Depression Increases.

* * *

Soviet Union to Buy 600 Tractors from British Makers.

* * *

Japan Exporting More Steel
Tubing and Rails and Is
Preparing to Supply All
Domestic Wire Rod Requirements.

* * *

United States Buying More
Alloy Steel Scrap from Germany.

The English Steel Corporation has booked an order for 500 tons of equipment in a fixed nitrogen plant for the Consolidated Mining & Smelting Co., of British Columbia. The lowest tender for electrification of the ninth Delta in Egypt is the Callender's Cable & Construction Co., which bid 505,000 Egyptian pounds sterling.

Tin plate is quiet and prices steady, with buyers inquiring, but actual business small. Continental buyers are the most interested among foreign consumers. Welsh mills are well booked, and output is running high although general production is restricted.

Galvanized sheets are quiet. Indian demand is affected by the political up-

heaval and mills are in need of orders, but prices are being upheld. Black sheets are inactive, with Far Eastern demand small.

The British Engineering Standards Association has revised the standard specification for British steel and has excluded basic Bessemer.

The Soviet Union has authorized importation of 600 tractors from the United Kingdom.

Japan to Supply All Wire Rod Needs

HAMBURG, GERMANY, May 5.—Exports of wire rods to the Far East are satisfactory at present, but Continental mills are compelled to grant concessions to meet American and Canadian prices. Quotations have recently receded to as little as \$7 7s. 6d. (\$35.84) per ton, c.i.f. Japanese port. Wire makers in Japan are reported as preferring the imported product to the domestic on the basis of quality.

YOKOHAMA, JAPAN, April 26.—The Kobe Steel Works is extending its facilities for production of wire rods and by August will have a monthly capacity of 4000 to 5000 tons, almost double its present output. The Asano-Kokura Steel Works is also preparing to produce wire rods and, with the Imperial Steel Works expanding its capacity, the total output will be almost sufficient to supply all requirements in western Japan.

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export.	£10 15s.	to £11 15s.	\$52.30 to \$57.17
Billets, open-hearth....	6 0	to 6 10	29.20 to 31.63
Black sheets, Japanese specifications	12 5		59.61
Tin plate, per base box..	0 18½	to 0 18½	4.46 to 4.50
Steel bars, open-hearth..	8 0	to 8 10	1.74 to 1.85
Beams, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Channels, open-hearth....	7 12½	to 8 12½	1.66 to 1.87
Angles, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	9 15	to 10 0	2.12 to 2.17
Galvanized sheets, No. 24 gage	11 17½	to 12 5	2.57 to 2.60

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£3 2½s.	to £3 3½s.	\$15.21 to \$15.45
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Billets, Thomas.....	4 13	to 4 14	22.63 to 22.87
Wire rods, low C., No. 5 B.W.G.	6 2	to 6 4	29.69 to 30.19
Rails, light.....	6 0		29.20
Black sheets, No. 31 gage, Japanese	11 5	to 12 12	54.68 to 58.32
Steel bars, merchant....	5 7½		1.18
Steel bars, deformed....	5 6½	to 5 7½	1.17 to 1.18
Beams, Thomas, British standard	5 1	to 5 2½	1.11 to 1.14
Channels, Thomas, American sections	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 6		1.17
Angles, Thomas, 3-in....	5 7½		1.18
Hoop and strip steel over 6-in. base	5 15		1.27
Wire, plain, No. 8 gage..	6 9		1.41
Wire, barbed, 4-pt. No. 12 B.W.G.	10 10		2.28
Wire nails, base.....	6 12½		\$1.44 a keg

Machinery Markets and News of the Works

Tool Trade Steady

Signs of Improvement Are Lacking, However—
Shipments Larger Than New Orders

SIGNS of improvement in the volume of machine tool buying are lacking, although here and there manufacturers and dealers report slight gains over the preceding week. This condition is too spotty, however, to permit any generalization as to current or nearby gains in orders.

Although the prospects for the near future might be encouraging if considered solely on the basis of the large amount of business that is pending, the slowness of most users of machine tools in closing orders for equipment leaves the machine tool trade with little hope of any marked improvement within the next month or two.

The index of orders for April prepared by the National Machine Tool Builders' Association bears out recent reports of a slow-moving machine tool

situation. The figure on April orders was 178.8, which, though one point above the March figure of 177.8 was below the lowest month of 1929, which was December with a rating of 222.1. The highest point last year was 330 in April.

Shipments of machine tools last month were slightly above those of March, but, as they were higher than new orders, a reduction in backlogs resulted. The index of unfilled orders dropped from 453.9 in March to 407.3 in April. Unfilled orders are less than twice the current rate of shipments, but are nearly twice as large as in 1927, the previous depression year in the machine tool industry. Indexes of both shipments and unfilled orders indicate that the machine tool industry is in a better position this year than in 1927.

New York

NEW YORK, May 20.—The machine tool market of the past week developed no new characteristic to distinguish it from the condition which has prevailed for many weeks. Orders are coming to local sellers in driplets, mostly single machines and not a great many of those. While the outlook would look promising if judged only by the amount of business that is pending, the indifference of most manufacturers as to expansion of their shop equipment or even in the rehabilitation of such equipment leaves the machine tool trade with little prospect of any important improvement in sales within the near future. Reports from Buffalo and Rochester indicate that sales are in somewhat better volume in that section than in other parts of the Eastern territory. In the district immediately adjacent to New York City there is very little activity.

Officials of Anaconda Wire & Cable Co., 25 Broadway, New York, operated by Anaconda Copper Mining Co., same address, have organized Anaconda Wire & Cable Co. of California, Inc., as a subsidiary, to take over and operate plants of California Wire & Cable Co., Oakland and Orange, Cal., recently acquired. Factories will be given over to production of copper wires, cable, magnet wire, etc.

Paragon Paint & Varnish Corporation, 47 Tenth Street, Long Island City, will soon take bids on general contract for a three-story addition, to cost about \$100,000 with equipment. Louis A. Abramson, 46 West Forty-sixth Street, New York, is architect.

George G. Miller, 545 Fifth Avenue, New York, architect, has plans for a four-story automobile service, repair and garage building, 82 x 95 ft., to cost about \$120,000 with equipment.

Walden Aircraft Corporation, Long Island City, has leased factory on Rawson Street for new plant to manufacture aircraft equipment.

Westchester Lighting Co., 9 South First Avenue, Mount Vernon, N. Y., has asked bids on general contract for a one and three-story power substation, and automobile service, repair and garage building at Pleasantville, N. Y., to cost about \$160,000 with equipment.

Martin Trailer Co., Westfield, Mass., manufacturer of motor truck trailers, axles, etc., has leased building at Foster Avenue and Rawson Street, Long Island City, for new factory branch, service and distributing plant.

General Fireproof Door Corporation, 900 Whittier Street, New York, has filed plans for a two-story addition, 50 x 90 ft., to cost over \$20,000 with equipment. I. L. Brausman is company architect.

American Can Co., 230 Park Avenue, New York, has plans for a two-story

plant at Terre Haute, Ind., to cost over \$750,000 with machinery. Company engineering department is in charge.

Samuel Pelton, 110 West Forty-second Street, New York, architect, has plans for a multi-story automobile service, repair and garage building, 100 x 150 ft., at Brooklyn, to cost about \$110,000 with equipment.

New York Steam Corporation, 280 Madison Avenue, New York, will carry out extensions and improvements in central steam power plant at Thirty-fifth Street and East River, including installation of additional equipment, to cost over \$1,000,000.

Brooklyn Brass Works, 263 Scholes Street, Brooklyn, has plans for a one-story foundry addition, 25 x 100 ft., to cost about \$35,000 with equipment. Lee & Hewitt, 53 Park Place, New York, are architects and engineers.

Consolidated Film Industries, Inc., Le-moine Avenue, Fort Lee, N. J., has plans for a one-story and basement machine shop, 26 x 240 ft., to cost over \$50,000 with equipment. Granville W. Dexter, 201 Main Street, Fort Lee, is architect.

Superior Welding Co., 627 Frelinghuysen Avenue, Newark, has acquired property, 50 x 100 ft., at Goble and Murray Streets, as site for new plant, to cost over \$35,000 with equipment. Present two-story building on part of site will be razed at once.

Jersey City Ladder Co., Inc., 677 Montgomery Street, Jersey City, N. J., will soon take bids for new two-story and basement plant, 45 x 140 ft., to cost over \$45,000 with equipment. Barney Singer, 921 Bergen Avenue, is architect.

Bureau of Yards and Docks, Navy Department, Washington, contemplates extensions at naval air station at Lakehurst, N. J., including mechanical shop, gas cell unit, and storage and distributing building, to cost over \$150,000 with equipment.

Kolb Sheet Metal Works, 339 Osborne Terrace, Newark, has filed plans for two-story addition for storage and distribution.

United Color & Pigment Co., Evergreen Avenue, Newark, has asked bids on general contract for a one-story addition, to cost over \$30,000 with equipment, which will include a pebble mill and other mixing apparatus, etc. Robert Bolton, 45 Branford Place, is architect and engineer.

New England

BOSTON, May 19.—While sales of new machines are few and of minor importance, dealers are busy negotiating with prospects, both old and new. Sentiment is more optimistic, and the general feeling is that considerable equipment will be purchased within the next three months. Demand for used tools holds up well, but sales are small and consist mostly of tool room lathes, drill presses,

power hack saws and occasionally a bench or floor type milling machine.

Indications are that sales of small tools this month will exceed those of April.

Ryan Valve Co., Westfield, Mass., has started operations. Company later plans expansion in plant and equipment.

Norma Hoffman Bearings Corporation, Stamford, Conn., will soon award a general contract for an addition, to cost \$125,000 with equipment.

City of Fitchburg, Mass., has preliminary plans for a trade school.

Dukerman Fuel Corporation, Salem, Mass., will soon start work on a one-story coal pocket, 24 x 30 x 56 ft. Conveying equipment is required.

Plant of Wade Machine Co., Lynn, Mass., was destroyed by fire the past week and all metal-working equipment lost. Company is planning for new factory and equipment.

Somerville Iron Foundry Co., Medford, Mass., has plans for a one-story plant, 55 x 150 ft., to cost \$50,000 without equipment.

Niles Machine Co., Lebanon, N. H., manufacturer of machinery and parts, has purchased plant of Lamson Co., Lowell, Mass., and will improve for new works. It is proposed to have unit ready for service during June.

Board of Education, Naugatuck, Conn., plans rebuilding part of manual training department in high school recently destroyed by fire, including replacement of tools and equipment.

General Motors Truck Co., 781 Worthington Street, Springfield, Mass., with main plant at Pontiac, Mich., has plans for a two and three-story service, repair and sales building at West Springfield, to cost about \$130,000 with equipment. H. C. Hearne, 1387 Main Street, Springfield, is architect.

New England Gas & Electric Association, 719 Massachusetts Avenue, Boston, is disposing of a bond issue of \$20,000,000, part of proceeds to be used for extensions and improvements in plants and system.

Gamewell Co., Newton Upper Falls, Mass., manufacturer of electric fire alarm and police signal systems, and other electric equipment, has acquired plant and business of Rockwood Sprinkler Co., Worcester, Mass., manufacturer of automatic sprinkler systems, etc., and will operate as a subsidiary. Main production unit will be located at Worcester, as heretofore, with branch assembling plant in Chicago.

American Brass Co., Waterbury, Conn., has approved plans for one-story addition, 160 x 200 ft., primarily for production of large diameter brass tubing, as made at local plant of Randolph-Clowes Co., a subsidiary, to cost over \$300,000 including machinery. Part of equipment will be removed from Randolph-Clowes plant to new unit and additional machinery provided.

A. G. Spalding & Brothers, Inc., Chicopee, Mass., manufacturer of sporting goods, plan rebuilding part of solvent plant destroyed by fire May 13, with loss of more than \$140,000 with machinery. Company is acquiring local factory formerly occupied by Stevens-Duryea Automobile Co., and plans removal of its affiliated organization, Wright & Ditson-Victor Co., Springfield, Mass., specializing in manufacture of tennis equipment, to that plant, with additional machinery for increased output.

The Crane Market

INQUIRY for electric overhead cranes continues limited to single installations and competition is keen for the small volume of business in the market at present. The Anglo-Chilean Consolidated Nitrate Corporation, New York, has closed on a list of two 100-ton, one 50-ton, one 25-ton and six 10-ton overhead cranes for Chile with the Shaw Electric Crane Co.

Inquiry for locomotive cranes is light and buying is limited to single units. The United Electric Light & Power Co. and the New York Edison Co. have each closed on a crawl-tread crane of about 25 tons capacity. Maceri Cutrupi, contractor, Fort Lee, N. J., has purchased a truck crane from the Universal Crane Co. Octavius Menici, Peabody, Mass., has closed on a gasoline-driven crawl-tread shovel and ditcher with the Orton Crane & Shovel Co.

Philadelphia

PHILADELPHIA, May 19.—Pennsylvania Railroad Co., Philadelphia, has awarded general contract to George A. Fuller Co., Morris Building, for one-story engine house with repair facilities, turntable, etc., at Parkside Avenue and Forty-eighth Street, to cost over \$180,000 with equipment. William H. Cookman is company architect.

Brown Instrument Co., Roberts Street and Wayne Avenue, Philadelphia, manufacturer of pyrometers and other measuring instruments, has plans for a two-story addition, 80 x 220 ft., to cost over \$75,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Messinger Bearings, Inc., D Street near Erie Avenue, Philadelphia, manufacturer of roller bearings, has filed plans for a one-story shop unit, to cost about \$22,000 with equipment.

Schaffhauser-Kiley Corporation, Philadelphia, recently formed with capital of \$150,000 by Otto Schaffhauser, 6399 Overbrook Avenue, and associates, contemplates early operation of local plant for manufacture of radio apparatus and devices, household appliances, etc. Thomas E. Waters, 315 Rodman Avenue, Jenkintown, Pa., is interested in new organization. Mr. Schaffhauser will be treasurer.

School Board, Swarthmore, Pa., has asked bids on general contract for a one-story vocational shop, to cost about \$25,000 with equipment. Ritter & Shay, Packard Building, Philadelphia, are architects.

Bell Telephone Co. of Pennsylvania, 1835 Arch Street, Philadelphia, has awarded general contract to Nelson Pedley Construction Co., Inc., 1512 Chestnut Street, for one-story and basement equipment storage and distributing plant, with automobile service, repair and garage unit, to cost about \$75,000 with equipment.

Kelso Mfg. Co., Market and Mill Streets, Trenton, N. J., manufacturer of brake lining, clutch facing, etc., plans rebuilding part of mill recently damaged by fire.

Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has awarded general contract to United Engineers & Constructors, Inc., 112 North

Broad Street, for power substation on Torresdale Avenue, to cost about \$125,000.

American Tin & Terne Plate Co., Inc., Twenty-fourth and Vine Streets, Philadelphia, manufacturer of roofing products, plumbing supplies, etc., has leased two-story and basement mill, 78 x 80 ft., at Emerald and Wishart Streets, for new plant, and will remove to new location and increase production.

Matthias J. Boyer 610 Chew Street, Allentown, Pa., and associates have organized Ro-T-Air-Y Clothes Dryer Co., and plan operation of local factory to manufacture patented clothes dryers and other equipment.

Gilbert Spruance Co., Richmond and Tioga Streets, Philadelphia, manufacturer of paints, varnishes, etc., has asked bids on general contract for an addition, to cost about \$40,000 with equipment. Clarence E. Wunder, 1520 Locust Street, is architect.

Ryan, Scully & Co., 3711 Wissahickon Avenue, Philadelphia, manufacturers of industrial furnaces, forges, controllers, etc., have plans for a new manufacturing building at Westmoreland and Stokley Streets, Philadelphia, to cost about \$100,000. When building is completed, company will assemble equipment and ship direct from plant instead of assembling it on job as is now being done.

Buffalo

BUFFALO, May 19.—Simonds Saw & Steel Co., Lockport, N. Y., has plans for a one-story addition, 75 x 100 ft., primarily for production of stainless steel, to cost over \$250,000 with equipment. Headquarters are at Fitchburg, Mass. William G. Merriman is general manager at Lockport plant.

Houdaille-Hershey Corporation, 537 East Delavan Avenue, Buffalo, manufacturer of shock absorbers and other automobile equipment, has acquired Lyon Cover Co., manufacturer of metal covers for tires, and will consolidate. Last noted company will be continued as a division of purchasing company and plans are under way for enlargement. Claire L. Barnes is president of Houdaille company.

Pierce, Butler & Pierce Mfg. Co., James Street, Syracuse, N. Y., manufacturer of boilers, heaters, etc., plans rebuilding part of plant destroyed by fire May 13, with loss reported over \$500,000 including equipment.

Fleet Aircraft of Canada, Ltd., recently organized as a subsidiary of Consolidated Aircraft Corporation, 2050 Elmwood Avenue, Buffalo, has work under way on a new plant at Fort Erie, Ont., to include parts department and assembling division, to cost about \$75,000 with machinery.

Board of Education, Holley, N. Y., plans installation of manual training equipment in new two-story high school, to cost about \$275,000. Carl C. Ade, 89 East Avenue, Rochester, N. Y., is architect.

P. B. & H. Moulding Co., 411 Canal Street, Syracuse, N. Y., manufacturer of metal moldings and kindred products, has purchased for new works three-story plant of U. S. Hoffman Machinery Co., manufacturer of clothes-pressing machines, at 329 Temple Street, and will remove to new location and increase capacity. U. S. Hoffman company has also recently disposed of its local plant on West Taylor Street to Doyle Machine & Tool Corporation, 322 Pearl Street, which will occupy for enlarged works.

Milwaukee

MILWAUKEE, May 19.—Machine tool business has lost some of its momentum and there has been a shrinkage in the volume of orders. However, considerable business is in prospect, and with inquiry continuing moderately active, the trade is hopeful of improvement in demand. Beyond replacement needs, requirements by the automobile industry are light.

Wrought Washer Mfg. Co., 46 South Bay Street, will proceed with work on its new plant, to cost about \$500,000 including equipment. On site is former Beaver Mfg. Co. gasoline engine plant, which will be remodeled. Plans include a new rolling mill, 65 x 500 ft.; storage building, 65 x 385 ft., and shipping room, 100 x 250 ft. Construction work will start about June 1 or 15. Fred Doepke, Sr., is president and general manager.

Screw Machine Products Co., Milwaukee, has been organized with a capital stock of \$15,000 to manufacture tools, dies, jigs, fixtures and automatic machine products. Principals include Henry O. Leech, 963 Thirty-eighth Street; James S. Elby, and H. A. Mueller. A shop is being equipped.

Board of Vocational Education, West Allis, suburb of Milwaukee, has engaged Robert A. Messmer & Brother, architects, 221 Wisconsin Avenue, Milwaukee, to design fourth unit, to cost \$80,000, of West Allis Vocational School. It is planned to begin work about July 1.

Excelsior Products Co., Washburn, Wis., contemplates installation of Diesel engine and generating equipment to supply current for its individual electric motor drive system, to effect economies over present central station supply.

National Carbonic Machinery Co., Wisconsin Rapids, Wis., has been incorporated with 4500 common shares without par value and \$100,000 preferred shares, as a reorganization of American Carbonic Machinery Co., same city. W. J. Binkley, Chicago, has acquired controlling interest and is refinancing company, which specializes in production of large refrigerating and air cooling apparatus. No new construction is planned at present, but some replacements of equipment will be made. Otto Labus will remain as works manager.

Schlueter Boiler Works, 320 North Main Street, Janesville, Wis., has plans by Frank Sadler, architect, 124 North Orchard Street, Madison, Wis., for a one-story shop addition, 40 x 75 ft.

Board of Vocational Education, South Milwaukee, Wis., has commissioned Parkinson & Dockendorff, architects, LaCrosse, Wis., to make plans for new \$100,000 vocational school to replace building badly damaged by fire recently.

Scanlon-Morris Co., 1902 East Johnson Street, Madison, Wis., manufacturer of hospital equipment, cabinets and other metal goods, has placed general contract with J. H. Findorff & Son, 601 West Wilson Street, Madison, for two-story extension, 40 x 80 ft. With equipment, investment will be about \$50,000.

All-Weather Sash Mfg. Co., Beloit, Wis., recently incorporated with \$150,000 capital stock, has completed organization and is about to lease existing shop for production of combination metal and wood window frames, eliminating sash pulleys, cords and weights.

Common Council, Waukesha, Wis., has approved plans by H. C. Haeuser, architect, 445 Milwaukee Street, Milwaukee,

for new two-story vocational school, 74 x 120 ft., and made appropriation of \$60,000. Detailed plans will be ready about June 1. O. B. Lindholm is director.

Maple Hill Mining Co., Platteville, Wis., has been incorporated by J. A. Kilber, Louis A. Hable and David J. Weigle to establish zinc mine west of city. Inquiry is being made for a 100-ton wet mill. Mine will be operated through incline shafts.

Chicago

CHICAGO, May 19.—Conditions in the local machine tool market vary. Some dealers find scattered orders more numerous and one seller reports that sales so far in May are running close to the April rate. It is quite probable, however, that business as a whole is in smaller volume than a week ago. Although competition is keen, prices appear to be holding.

The Union Pacific is in the market for 40 pneumatic tools, a 5000-lb. steam hammer, three floor grinders, 36-in. power shear, four portable pipe threaders, five grinders, 6-ft. radial drill, an axle lathe and a journal turning machine. The car shop list of the Milwaukee Road is active. Additional purchases are in sight from Nash Motors Co., and several farm machinery manufacturers are preparing programs.

Fairmont Railway Motors, Inc., Fairmont, Minn., will erect a one-story manufacturing building, 150 x 300 ft. Frank D. Chase, Inc., 720 North Michigan Avenue, Chicago, is architect.

Vortex Mfg. Co., 421 North Western Avenue, Chicago, manufacturer of paper cups and containers, has plans for a four-story addition, to cost about \$100,000 with equipment. Weiss & Neistadt, 53 West Jackson Boulevard, are architects.

Apex Regulator Co., 129 East Main Street, Marshalltown, Iowa, has plans for new one-story plant, 60 x 125 ft., to cost about \$30,000 with equipment. H. E. Reimer, address noted, is architect in charge.

Farmers' Union Terminal Association, Minnesota Building, St. Paul, Minn., will soon begin construction of an addition to grain elevator foot of Chestnut Street, to cost about \$120,000 with elevating, conveying, screening and other equipment. M. W. Thatcher is general manager.

Niemann-MacKenzie, Inc., Chicago, recently organized, has leased three-story factory, 100 x 100 ft., at Western and Fullerton Avenues, for new plant to manufacture furniture. Company will operate with capital of \$150,000.

Poston Brick Mfg. Co., 2600 South Grande Avenue, Springfield, Ill., manufacturer of vitrified paving brick, is considering a one-story addition, to cost about \$55,000 with equipment.

City Council, Manchester, Iowa, has plans by Great Lakes Gas & Utility Corporation, Independence, Iowa, for new artificial gas plant, to cost about \$70,000.

G. M. Davis Regulator Co., 422 Milwaukee Avenue, Chicago, manufacturer of pressure reducing valves, etc., has work under way on new one-story plant, 120 x 220 ft., to cost about \$60,000, for which general contract recently was let to Abell-Howe Co., 53 West Jackson Boulevard. G. M. Davis is president.

Northern States Power Co., 15 South Fifth Street, Minneapolis, Minn., has approved plans for an addition to steam-operated electric power plant at Minot,

N. D., to cost about \$75,000 with equipment.

La Plant-Choate Co., Cedar Rapids, Iowa, will erect a machine shop, 128 x 140 ft., adjoining its plant, at a cost of \$25,000. A pattern shop, 46 x 100 ft., will also be built.

St. Louis

ST. LOUIS, May 19.—W. G. Shelton Co., Seventh and St. Charles Streets, St. Louis, manufacturer of electrical devices and equipment, has plans for new three-story factory, to cost about \$100,000 with equipment. A. J. Widmer & Associates, Inc., Fullerton Building, are architects.

Hillyard Chemical Co., 801 South Ninth Street, St. Joseph, Mo., manufacturer of industrial chemicals, will take bids at once on general contract for two-story storage and distributing plant, 85 x 115 ft., to cost about \$140,000 with equipment. E. R. Meier, Bartlett Building, is architect.

Arkansas Bauxite Co., Little Rock, Ark., care of Edgar G. Hanschke, Little Rock, recently formed by Mr. Hanschke and associates, is planning establishment of new plant for production of commercial bauxite. Bauxite properties have been acquired near granite mountain. Mr. Hanschke is president of new organization.

Pallady Welding Co., 415 West Fourth Street, Oklahoma City, Okla., has awarded general contract to Harry Reynolds Construction Co., Franklin Building, for one-story plant, 50 x 100 ft., to cover cost over \$25,000 with equipment.

Central Power Co., Grand Island, Neb., is planning new steam-operated electric generating station on Platte River, to cost over \$70,000 with equipment. A. D. Baker, Clinic Building, is architect.

Phillips Petroleum Co., Bartlesville, Okla., has plans for extensions in gasoline plant at oilfields near Oklahoma City, Okla., to cost over \$250,000 with machinery and compressor stations.

Sinclair Consolidated Oil Corporation, 45 Nassau Street, New York, has acquired Pierce Petroleum Corporation, 1709 Locust Street, St. Louis, operating refineries at Sand Springs, Okla.; Tampico, Mexico; pipe lines in Texas and other States, with several hundred oil storage and distributing plants. Purchasing company will consolidate with organization and contemplates installation of additional equipment.

P. O. Denham, 701 North Western Avenue, Oklahoma City, Okla., and associates have plans for a new ice-manufacturing plant, to cost over \$40,000 with equipment.

Board of Trustees, Washington University, St. Louis, has plans for additions, to include mechanical, electrical and civil engineering divisions, to cost over \$500,000 with equipment. Jamieson & Spearl, Arcade Building, are architects.

Columbia Iron Works, Inc., 4254 Vista Street, St. Louis, has arranged for increase in capital from \$18,000 to \$75,000, for expansion.

Southern Pacific Railroad has purchased a Putnam car axle journal and axle lathe for its Algiers, La., shops from Manning, Maxwell & Moore.

Pittsburgh Plate Glass Co., G. M. Oakes, general manager, Crystal City, Mo., is erecting an addition to its plant to cost \$1,000,000. Building will be used for production of crude glass by a new continuous flow process.

Knapp-Monarch Co., St. Louis, has leased 3200 sq. ft. of floor space at 1906 Pine Street, for a tool and die shop and experimental laboratory. About \$10,000 additional capital has been invested.

Missouri-Kansas-Texas Railroad has purchased a Mattison motor-driven molder, a Greenlee motor-driven planer and a Quick Work motor-driven shear for its shops at Sedalia, Mo., from Manning, Maxwell & Moore.

South Atlantic

BALTIMORE, May 19.—Chesapeake & Ohio Railroad Co., Richmond, Va., will install new material-testing department at shops at Huntington, W. Va., to cost about \$70,000. C. W. Johns is chief engineer.

Central Atlantic States Service Corporation, Hagerstown, Md., is considering rebuilding part of local ice-manufacturing plant recently destroyed by fire, with loss of about \$50,000 including machinery.

Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, plans installation of conveying, elevating and other mechanical-handling equipment, in new two-story storage and distributing plant at Richmond, Va., 120 x 260 ft., to be constructed by Richmond, Fredericksburg & Potomac Railroad Co., and occupied under lease.

Board of District Commissioners, District Building, Washington, is asking bids until June 10 for new mechanical shop, garage and laboratories, totaling 1,205,675 cu. ft., and for addition to present district automobile repair shops, 293,625 cu. ft., and remodeling, as per plans and specifications on file at room 427 District Building. Board has engaged Metcalf & Eddy, Stadler Building, Boston, engineers, to prepare plans for new incinerator plant, with mechanical-handling equipment, to cost \$350,000 including machinery, for which bids will be asked soon.

Virginia Public Service Co., Charlottesville, Va., will soon begin superstructure for steam-operated electric generating plant at Brems Bluff, Va., to cost over \$600,000 with transmission lines.

Gulf Refining Co., Frick Building, Pittsburgh, is considering new oil storage and distributing plant at Baltimore, consisting of five one-story units, to cost over \$125,000 with equipment. Company engineering department is in charge.

Officials of J. E. Lock & Co., Charlotte, N. C., manufacturers of textile mill equipment, are organizing Lock Bobbin & Spool Co., Inc., to take over and expand former company.

Board of Trustees, Georgia School of Technology, Atlanta, will soon take bids on general contract for new three-story aviation building, to cost about \$90,000 with equipment. Prof. Harold Bush Brown, department of architecture, is architect.

W. J. Loth Stove Co., Waynesboro, Va., contemplates installation of additional equipment for larger output. Officials of Virginia Public Service Co., Charlottesville, Va., have secured an interest in company and will be identified with management.

Crane Co., 836 South Michigan Avenue, Chicago, has leased two-story building to be constructed at Asheville, N. C., for new factory branch and distributing plant, to cost about \$50,000 with equipment. Henry I. Gaines, Public Service Building, Asheville, is architect.

Despres Dowel Mfg. Co., Grand Rapids, Mich., manufacturer of dowel pins, etc.,

has acquired plant and business of Dixie Dowel Co., Winston-Salem, N. C., and will operate as subsidiary.

Cleveland

CLEVELAND, May 19.—The volume of machine tool business continues rather light and not much new inquiry came out the past week. Following its purchases previously reported, an Ohio steel plant during the week bought a 48-in. x 20-ft. planer. The Air Corps, War Department, Dayton, Ohio, has issued inquiries for four 16-in. and one 18-in. lathes and seven woodworking machines for various flying fields. Bids will be received June 9.

Mullens Mfg. Co., Salem, Ohio, has acquired Salem plant of American Steel & Wire Co., which was abandoned two years ago after being operated as a wire mill for nearly half a century. Mullens company will use plant for increasing its present capacity.

Lake Erie Forge & Machine Co., University Road, Cleveland, has awarded general contract to James C. F. Shafer Co., 16501 Euclid Avenue, for one-story addition, 50 x 110 ft., to cost about \$45,000 with equipment.

Howard Mercer, East Liverpool, Ohio, is at head of project to establish local plant for manufacture of spark plug porcelain, and has purchased recently vacated plant of Homer Laughlin China Co., from which equipment is now being removed. Building will be remodeled and mixing machinery, presses, etc., will be installed soon. It is proposed to organize a company to carry out enterprise.

United States Air Compressor Co., 5300 Harvard Avenue, Cleveland, has asked bids on general contract for one-story addition, 100 x 140 ft., to cost about \$75,000 with equipment. George S. Rider Co., Century Building, is architect and engineer.

B. F. Goodrich Co., Akron, Ohio, manufacturer of automobile tires and mechanical rubber goods, is arranging for bond issue of \$30,000,000, part of proceeds to be used for expansion and betterments. Company has also authorized increase in common stock from 1,500,000 to 4,000,000 shares for similar purpose.

Officials of Libbey-Owens Glass Co., Toledo, Ohio, manufacturer of sheet glass products, have organized Libbey-Owens-Ford Glass Co., to take over present company and consolidate with Edward Ford Plate Glass Co., Rossford, Ohio, latter company to be taken over for price of \$13,300,000. Ford plant will be maintained at present location and expanded. James C. Blair is president of consolidated organization.

Detroit

DETROIT, May 19.—City Council, Portland, Mich., is considering extensions and improvements in municipal electric light and power plant, including installation of additional equipment, to cost \$50,000.

E. H. Sheldon & Co., Muskegon, Mich., manufacturer of vocational school furniture and equipment, laboratory equipment, etc., has leased space in building at Sarnia, Ont., for branch plant.

Motor Wheel Corporation, Lansing, Mich., has arranged for a new stock issue of 25,000 shares, part of proceeds

to be used for expansion and betterments and for acquisition of a majority of common stock of Cleveland Welding Co., Cleveland, which will be operated in future as an affiliated organization. Company is giving over part of production at Lansing to oil-burning appliances and equipment, including furnaces for domestic service, oil-burning ranges and water heaters.

Kawneer Co., Niles, Mich., manufacturer of bronze door fronts, doors, windows, etc., has purchased Adelbert Coleman Architectural Metal Work Co., Chicago, formerly known as Chicago Ornamental Iron Works. Acquired company will maintain corporate identity and will be operated as division of purchasing organization.

Board of Education, 1354 Broadway Avenue, Detroit, is considering installation of manual training equipment in three-story addition to Pershing High School, to cost about \$425,000. Smith, Hinchman & Grylls, Marquette Building, are architects and will take bids on general contract early next month.

Muskegon Motor Specialties Co., Muskegon, manufacturer of automotive equipment and devices, has arranged for increase in capital from 125,000 to 500,000 shares of stock, no par value, part of proceeds to be used for expansion, including acquisition of Jackson Motor Shaft Co., Jackson, which will be operated as a subsidiary. Company is planning increase in output in camshaft division.

Board of Supervisors, Alpena, is considering establishment of municipal airport, including hangars, repair and reconditioning shop, oil storage and other units, to cost over \$75,000 with equipment.

U. S. Pressed Steel Co., Ypsilanti, Mich., has bought from Youngstown Sheet & Tube Co. Harrow Spring Co., Kalamazoo, Mich., and will take control June 1. Harrow Spring Co. has been engaged in manufacture of harrow and cultivator spring teeth, weeder and rake teeth and other products for nearly 50 years. After alterations U. S. Pressed Steel Co. will move its entire plant from Ypsilanti to Kalamazoo.

Pittsburgh

PITTSBURGH, May 19.—New inquiry for machine tools has improved slightly the past week, but business is by no means good. Orders are confined largely to small lots, with replacement parts in active demand. The railroads are not expected to make any substantial purchases until after the exhibit of the Railway Supply Manufacturers' Association at Atlantic City in June. Although machine tool manufacturers will not exhibit at this convention, the exhibition will be of considerable importance to the machine tool trade.

Prospects for the machinery business in the Pittsburgh district are not clearly defined. Industrial activity may decline further in the next two months, but in some cases this may act as a stimulant to buying rather than as a deterrent. Several large expansion programs are under way, but most of these call for heavy equipment which is already under construction in the shops of local machinery builders. Weirton Steel Co., Weirton, W. Va., will break ground soon for its new combination rail mill.

Reliance Steel Castings Co., Twenty-eighth and Smallman Streets, Pittsburgh,

has revised plans for one-story foundry addition, to cost about \$45,000 with equipment. Lake & Davidson, Negley Building, are architects.

J. W. Howell, secretary, School District of Mount Lebanon Township, near Pittsburgh, is asking bids until June 12 for laboratory tables, lockers, and other school equipment. Charles L. Wooldridge, Inc., Fulton Building, Pittsburgh, is consulting engineer.

Pennzoil Co., Drake Theater Building, Oil City, Pa., has approved plans for one-story works, 60 x 120 ft., at Romeville, Pa., including installation of car shop, forge shop, welding works, wood-working shop, and machine repair shop for oil equipment, to cost over \$55,000 with equipment.

General Bronze Co., Thirty-second and Smallman Streets, Pittsburgh, manufacturer of bronze bearings, bushings, castings, etc., is offering a bond issue of \$3,000,000, part of proceeds to be used for expansion and betterments in different plants.

Gulf States

BIRMINGHAM, May 19.—Panhandle Power & Light Co., Borger, Tex., has approved plans for new steam-operated electric generating plant near Wheeler, Tex., to cost over \$1,000,000 including transmission lines to points in this section for oil well and other service.

City Ice & Fuel Co., 6611 Euclid Avenue, Cleveland, Ohio, has purchased 12 ice-manufacturing plants at Palm Beach, Miami, Fort Lauderdale, Coral Gables and Hollywood, Fla., with gross capacity of 1000 tons per day. Plants will be continued at present locations and expansion is planned, with installation of additional equipment in several units. Entire project will represent investment of about \$2,000,000.

Bogalusa Coca-Cola Bottling Co., Bogalusa, La., plans installation of automatic bottling machinery, conveying and other mechanical-handling equipment in new two-story plant to cost over \$50,000 with machinery.

Following recent purchase of municipal electric light and power plant at Stratford, Tex., West Texas Utilities Co., Abilene, is planning extensions and improvements for central station service, extensions in transmission lines, etc., to cost over \$80,000.

Mosher Steel & Machinery Co., Dallas, Tex., has acquired adjoining property, totaling about 48,000 sq. ft., for expansion. Company also operates Houston Structural Steel Co., Houston, Tex.

Claussen-Greenwood Mfg. Co., San Antonio, Tex., recently organized by H. H. Claussen, 212 Torcido Drive, and associates, is planning operation of local plant to manufacture safe locks, vault doors and kindred products.

Southern Natural Gas Corporation, Birmingham, has arranged fund of \$15,000,000 for extensions and improvements, including pipe line construction for service at Mobile, Ala., Pascagoula, Miss., Montgomery, Ala., and Macon, Ga., with compression stations, etc.

Scobey Fireproof Storage Co., North Medina Street, San Antonio, Tex., has awarded a general contract to McKenzie Construction Co., Travis Building, for four-story and basement cold storage and refrigerating plant, to cost about \$225,000 with machinery.

Lee Pool, Greenville, Tex., and associates have plans for a one-story ice-

manufacturing plant, 60 x 75 ft., at Sherman, Tex., to cost about \$55,000 with machinery.

American Cast Iron Pipe Co., Birmingham, is replacing one of its old pipe shops with a new building, 90 x 350 ft., one story. New machinery will be installed.

Cincinnati

CINCINNATI, May 19.—With a slight increase in demand for radial drills and a fairly steady call for lathes, the machine tool market shows improvement over that of a week ago. While fresh bookings are mostly for one or two tools, they are well distributed and indicate that buyers are not only replacing old machinery, but in some instances are supplementing present equipment. Demand for planers, however, continues slow. Shipments are practically up to date and local tool builders are becoming more dependent upon current bookings to sustain production.

Standard Register Co., South East Albany Street, Dayton, Ohio, manufacturer of flat and roll printing registers, manifold registers, etc., has awarded general contract to A. W. Kimmel Co., Dayton, for one-story addition, to cost \$50,000 with equipment.

Mead Corporation, Chillicothe, Ohio, recently organized to take over and consolidate Mead Pulp & Paper Co., and Mead Strawpulp Co., both with local mills, and Mead Fibre Co., Kingsport, Tenn., has arranged for a bond issue of \$9,500,000, part of fund to provide for merger and for expansion and improvements. Company specializes in manufacture of corrugated paperboard, liner board, etc.

Brighton Copper Works, 2160 Western Avenue, Cincinnati, has awarded general contract to Harry Kaiser, 2445 Kipling Avenue, for one-story and basement plant, 56 x 100 ft., to cost about \$40,000 with equipment. J. C. Grunkemeyer and C. W. Sullivan, 3717 Eastern Avenue, are associate architects.

Austin & Virtue, Huntington Bank Building, Columbus, Ohio, architects, have plans for an eight-story automobile service, repair and garage building, to cost about \$200,000 with equipment.

Memphis Power & Light Co., Memphis, Tenn., is planning extensions and improvements in steam-operated electric generating plant, including installation of additional equipment, to cost about \$300,000. Mark Eldredge is chief engineer.

Owensboro Milling Co., Owensboro, Ky., plans rebuilding of flour milling plant recently destroyed by fire, with loss reported close to \$100,000 including equipment.

Holston Quarry Co., General Building, Knoxville, Tenn., will install two large rock crusher units, conveyor apparatus, screening equipment, steam shovel and other machinery at properties at Watauga, Tenn., to cost close to \$100,000.

City Council, Jackson, Tenn., will receive bids until May 28 for equipment for municipal electric light and power plant, including two 2000-kw. turbo-generators, condensers, two 500-hp. boilers, with stokers, economizers and auxiliaries; coal and ash-handling equipment, superheaters, six-panel switchboard, forced and induced draft fans, and complete accessories. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Indiana

INDIANAPOLIS, May 19.—Big Four Railroad Co., Big Four Building, Cincinnati, has awarded general contract to Ellington-Miller Co., 25 East Jackson Boulevard, Chicago, for unit at repair shops at Beech Grove, near Indianapolis, 184 x 444 ft., to cost about \$160,000 with equipment. Hadley Baldwin, address noted, is chief engineer.

Adams Plating Co., 138 West Tenth Street, Indianapolis, will carry out expansion at plant, including installation of plating tanks and auxiliary equipment.

Shepard & James, Inc., 21 No. Alabama Street, Indianapolis, manufacturer of oil burners and oil-burning equipment, filling station equipment, etc., has leased about 20,000 sq. ft. floor space in former local plant of National Automobile Co., and will remove to that location and install additional equipment for increased production. Shotwell Co., address noted, and Sherman Oil-Gas Burner Co., 134 Monument Circle, affiliated organizations, will also remove headquarters to new location.

Indiana Oxygen Co., 439 Harmon Street, Indianapolis, manufacturer of industrial oxygen, etc., has awarded general contract to Ray Fatout, Inc., Board of Trade Building, for two-story and basement plant, 90 x 195 ft., to cost more than \$50,000 with equipment. Bishop, Knowlton & Carson, 312 North Meridian Street, are architects.

Mullins-Gibson Mfg. Co., Rushville, Ind., manufacturer of tractor clutches, disk jointers and other equipment, plans rebuilding part of foundry destroyed by fire May 14.

Aladdin Industries, Inc., 601 West Lake Street, Chicago, manufacturer of vacuum bottles, jars, etc., has awarded general contract to W. R. Dunkind & Son, Huntington, Ind., for two-story and basement unit, 90 x 160 ft., at Alexandria, primarily for storage and distribution, to cost over \$50,000 with equipment. Max N. Dunning, 310 South Wabash Avenue, Chicago, is architect.

Pacific Coast

SAN FRANCISCO, May 15.—Le Tourneau Mfg. Co., Moss Street, Stockton, Cal., manufacturer of road-building machinery and parts, is considering one-story addition, to cost about \$40,000 with equipment.

Stephens-Adamson Mfg. Co., 2227 East Thirty-seventh Street, Vernon, Los Angeles, manufacturer of conveying, elevating and other material-handling equipment, with main plant at Aurora, Ill., has plans for two-story and basement factory branch and distributing plant, to cost about \$35,000 with equipment. Hamm, Grant & Bruner, Inc., Ferguson Building, Los Angeles, is architect and engineer.

Spreckels Sugar Co., 2 Pine Street, San Francisco, has acquired six acres at Sacramento, Cal., as site for new repair and equipment shops, with storage and distributing plant to cost over \$100,000 with equipment. Company engineering department is in charge.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is arranging a preferred stock issue to total \$10,000,000, part of proceeds to be used for extensions in power plants and system.

Escondido Union High School District, Escondido, Cal., has plans for a one-story vocational training shop, 50 x 178 ft., to cost about \$40,000 with equipment. T. C. Kistner & Co., Architects' Building, Los Angeles, are architects.

Plomb Tool Mfg. Co., 2209 Santa Fe Avenue, Los Angeles, manufacturer of forged hand tools, hammers, chisels, etc., plans rebuilding part of plant recently destroyed by fire, with loss about \$45,000 including equipment.

City Council, Eugene, Ore., is arranging call for bids for equipment for municipal steam-operated electric generating plant, for auxiliary service in connection with present municipal hydroelectric power plant, to include boilers, oil-burning apparatus, pumps, etc., to cost \$370,000. Stevens & Koon, Spalding Building, Portland, are consulting engineers.

Puget Sound Lumber Co., Tacoma, Wash., is planning to rebuild saw mill and plant destroyed by fire May 8.

Kerr, Gifford & Co., Lewis Building, Portland, is considering construction of flour mill, including elevating, conveying, screening and other equipment, to cost more than \$350,000.

W. P. Fuller Co., 301 Mission Street, San Francisco, manufacturer of paints, varnishes, etc., will soon take bids on general contract for two-story and basement factory branch and distributing plant at Sacramento, to cost about \$40,000 with equipment. Coffman, Sahlberg & Stafford, Forum Building, Sacramento, are architects.

Canada

TORONTO, May 19.—The awarding of contracts for tools for the new Northern Technical School at Toronto accounted for considerable improvement in machine tool sales recently. While some of this business went to the United States, the bulk was placed with Canadian makers. Current demand for machine tools shows improvement over that of previous weeks and builders and dealers report sales at a satisfactory level. A number of industrial plants are under construction for which equipment has not yet been purchased. A good demand for tools is reported from the mining districts. Small tools are active and substantial orders are being closed from time to time.

Teck Hughes Gold Mines, Ltd., Kirkland Lake, Ont., will start work soon on erection of a new 300-ton unit. This will be followed later by a second unit of similar capacity. Foundations are under way.

C. Beck Co., Ltd., 10 Parliament Street, Toronto, has let contract to J. Bodie Construction Co., Ltd., Canada Permanent Building, for a one-story addition, 70 x 130 ft.

Dominion Bridge Co., Montreal, is planning to reopen National Bridge works at Longue Pointe. This plant has not been operated by Dominion Bridge Co. for about 15 years, but owing to expansion in company's business additional fabricating facilities are necessary. It is understood plant will be reequipped and used for production of light class of materials and some new lines.

Ontario Vitrified Products, Ltd., 34 King Street East, Toronto, contemplates erection of a plant at Etobicoke, Ont., to cost \$30,000.

Western Canada

Plans are under way for erection of an oil refinery at Burnaby, B. C., for

Shell Co. of British Columbia, 559 East Fifth Avenue, Vancouver, B. C.

Sidney Roofing & Paper Co., Ltd., Vancouver, B. C., is planning erection of a \$200,000 manufacturing plant at Victoria, B. C.

Foreign

PLANs are under way by J. G. White Engineering Corporation, 43 Exchange Place, New York, for construction of a dam on Lake Tsana, Western Abyssinia, for which contract has been secured from Government, to cost about \$20,000,000. H. A. Lardner, vice-president, has recently returned from an inspection trip to site.

Cie. Francaise des Procédes Thomson-Houston (Thomson-Houston Electrical Co.), Paris, France, manufacturer of electrical machinery, power equipment, etc., has authorized increase in capital from 330,000,000 to 550,000,000 francs (about \$13,200,000 to \$22,000,000), of which an issue totaling 110,000,000 francs (about \$4,400,000) will soon be sold, part of

fund to be used for expansion. Company is planning early construction of a new plant to manufacture talking picture machinery and parts.

Government Department of Public Works, Madrid, Spain, has authorized an appropriation of 4,000,000 pesetas (about \$480,000) for hydroelectric power projects on Alberche and La Toba Rivers, for which plans will be drawn soon.

Jantzen Knitting Mills, Inc., Sandy Boulevard, Portland, Ore., has arranged for a preferred stock issue to total \$500,000, proceeds to be used for establishment of new mill in London, England.

A project is under consideration in Greece for construction of a hydroelectric generating plant on Vouraikos River, near Patras, including transmission lines and distributing system, to cost \$1,250,000. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Greece No. 332983.

Department of Aeronautics, Government of Italy, Rome, has secured a fund of \$40,000,000 for aircraft operations, including airplanes and parts, hangars, repair and reconditioning shops, operating service, etc., during 1930-31.

Record Machine Tool Exports in 1929

Gain in Sales to Many Markets—Europe Received More Than Half of American Shipments

WASHINGTON, May 19.—The total value of metal-working machinery exports in 1929, \$40,803,000, was almost 18 per cent in excess of the large 1928 total and 60 per cent greater than the value of exports in 1927. A feature of this increased trade in metal-working machinery was the gain in shipments to European countries, which received \$25,205,000 worth last year, almost 25 per cent more than in 1928 and 73 per cent more than in 1927. This gain is noteworthy by the fact that the Continental countries include leading producers of metal-working machinery. The steady advance of American exports of machinery to Europe is shown in the percentage of total exports moving to these markets, 51 per cent of all shipments in 1926, 58 per cent in 1927, 60 per cent in 1928 and 62 per cent in 1929.

The percentage of American metal-working machinery exports taken by Canada has also been increasing since 1925, when Canada, Newfoundland and Labrador took about 11 per cent compared with about 21 per cent last year. Shipments to Mexico and Central American markets increased appreciably, especially to Mexico. Asiatic countries, excluding the Near East, took \$2,928,000 worth of metal-working machinery in 1929, compared with \$2,373,000 in 1928.

Trade with Soviet Union has been expanding as a result of the extensive industrial program of that country, and more recently the five-year industrial plan, which became effective in the fiscal year 1928 to 1929. In 1927 and 1928, purchases of Amer-

ican metal-working machinery by the Soviet Union exceeded \$1,000,000 and in 1929 increased to \$2,620,000, placing Russia considerably ahead of Germany as a market outlet.

New Trade Publications

Desulphurizer.—Mathieson Alkali Works, Inc., New York. A small 12-page booklet, entitled "The A B C of Purite," discusses fluxing the cupola and is written by George S. Evans, metallurgist. It discusses cupola melting practice with an explanation of the action of Purite as a fluxing agent.

High Temperature Alloy.—Michigan Steel Casting Co., Detroit. Series of bulletins describing MISCO, an alloy steel available in either cast or rolled forms, and suitable for temperature-resistant parts, such as furnace doors and frames, chains, carburizing and annealing boxes, trays and retorts.

Baffles for Water Tube Boilers.—Boller Engineering Co., Newark, N. J. Folder showing construction of BECO baffles as applied to water tube boilers of various design.

Weld-Built Motors.—Electro-Dynamic Co., Bayonne, N. J. Descriptive Sheet No. 262 illustrates constructional details of a direct current motor that contains no cast parts, and incorporates many modern methods of mechanical construction.

True-Blue Tapered Roller Bearings.—Hoover Steel Ball Co., Ann Arbor, Mich. Broadside describing advantages of tapered roller bearings with heat-treated retainers finished with high accuracy, and containing rollers polished to a mirror finish on faces and ends.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

EUROPEAN governments are invited to form a federation or moral union by Aristide Briand, foreign minister of France, to have permanent officers under whose auspices regular meetings could be held for discussion of problems of mutual interest.

ALLIED Reparations Commission and the Dawes plan regime disband. Bank of International Settlements opens its doors and offers \$68,000,000 capital stock, the necessary ratifications of the Young plan having been obtained. . . . The last Rhine bridgehead occupied by the French army has been ordered evacuated.

PARITY with Great Britain's navy in 1937 will cost us \$1,100,000,000 for new ship construction, according to an estimate by the Naval General Board. . . . Premier Mussolini says that Italy will match France battleship for battleship. . . . Salt Lake City, the first of the 10,000-ton cruisers authorized in 1924, meets acceptance tests with speed of 32.5 knots. She develops 110,000 hp. and carries 10 eight-inch guns, but only 1½-in. belt armor. . . . Navy yards have discharged 2200 civilian workers since January, with the prospect of eliminating 3000 more unless ship construction or modernization is authorized before fall.

KEELE is laid for the first of 26,000-ton twin ships for Matson Line, to sail between San Francisco and Australia at 20.5 knots and to cut the present 19-day schedule materially. . . . Work laid out at Fore River plant of Bethlehem Shipbuilding Corporation for the next three years will aggregate \$270,000,000, and give steady employment for 35,000 men in the various contributing industries. . . . Introduction of "cabin" ships and improvements in quarters has seriously reduced number of first-class

passengers carried by the transatlantic lines.

BUS competition and use by railroads of buses and trucks for delivery auxiliaries and for alternative routes, will be investigated by Interstate Commerce Commission. . . . Northland Grayhound Lines, Inc., operating long distance buses, earned \$2.41 per share in 1929, vs. \$1.99 in 1928. . . . Baltimore & Ohio Railroad will spend \$1,000,000 on new freight facilities at Toledo, Ohio. . . . Monopoly of taxicabs by Philadelphia Rapid Transit Co. is not profitable. Cabs and rights were paid for in 7-per cent preferred stock, but net income is only 6 per cent on capital investment.

CARS sold and net earnings of General Motors in first quarter both come to about 75 per cent the corresponding figures, January to March of last year. . . . Ford production is at a materially higher rate than a year ago. Production at foreign plants is one-eighth the total. . . . Chrysler sharply reduces prices on certain closed models. . . . Tires in manufacturers' hands number about 13,500,000 (as compared to 16,300,000 a year ago)—about 70 days' production at the current rate. . . . Intisy, the most prolific rubber bearing shrub of Madagascar, is found by the Department of Agriculture to thrive in Florida and southern California.

AWARD for the most meritorious service to industry by a trade association was given the National Automobile Chamber of Commerce, which pooled 1700 patents for the mutual good of all manufacturers. . . . Suit has been filed against the Radio Corporation of America and others, under the anti-trust act, to determine whether pooling and cross licensing of some 3500 patents constitutes restraint of trade.

CRUDE oil prices in southern Pennsylvania have declined from \$4.10 to \$2.50 a barrel in a year, owing to competition from lubricants derived from South American and Oklahoma petroleum at \$1.40 a barrel, and to new synthetic products. . . . Producers in Santa Fe Springs field, who refused to agree to conservation program accepted by all other California fields, are offered only half the average price for their output by the leading refinery. . . . W. C. Teagle, president Standard Oil Co. of New Jersey, said that "the degree of prosperity experienced by the industry is in inverse ratio to the surplus crude and products it carries from year to year."

LABOR disputes of 25 years' standing between steel erectors and structural iron workers will be arbitrated by William Green, president American Federation of Labor.

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COMING MEETINGS

May

Society of Automotive Engineers. May 26 to 29. Summer meeting, French Lick Springs Hotel, French Lick Springs, Ind. C. F. Clarkson, 29 West Thirty-ninth Street, New York, general manager.

American Electrochemical Society. May 29 to 31. Spring meeting, Coronado Hotel, St. Louis. Collin G. Fink, Columbia University, New York, secretary.

June

Associated Machine Tool Dealers. June 4 and 5. Annual meeting, Granville Inn, Granville, Ohio. A. G. Bryant, Joseph T. Ryerson & Son Co., Chicago, secretary.

National Association of Foremen. June 6 and 7. Annual meeting, Civic Auditorium, Toledo, Ohio. H. J. Baum-

ker, 316 Tenth Street, Toledo, convention secretary.

American Management Association. June 9 and 10. Production conference, Hotel Statler, Cleveland. W. J. Donald, 20 Vesey Street, New York, managing director.

American Society of Mechanical Engineers. June 9 to 12. Semi-annual meeting, Book-Cadillac Hotel, Detroit. Oil and Gas Power Division, June 12 to 14. Third annual meeting, State College, Pa. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

National Association of Purchasing Agents. June 16 to 19. Inform-A-Show and fifteenth annual convention, Stevens Hotel, Chicago. G. A. Renard, 11 Park Place, New York, secretary.

National Association of Flat Rolled Steel Manufacturers. June 16 to 18. Annual convention of sheet steel executives, White Sulphur Springs, W. Va.

A. N. Flora, Terminal Tower Building, Cleveland, secretary.

Association of Iron and Steel Electrical Engineers. June 16 to 20. Convention and exposition, Broadway Auditorium, Buffalo. J. F. Kelly, 1010 Empire Building, Pittsburgh, secretary.

World Power Conference. June 16 to 25. Second conference, Berlin, Germany. O. C. Merrill, Edmonds Building, Washington, general chairman of American committee.

American Society for Testing Materials. June 23 to 27. Annual meeting, Haddon Hall Hotel, Atlantic City. N. J. C. L. Warwick, 1315 Spruce Street, Philadelphia, secretary.

Steel Founders' Society of America. June 26 to 28. Semi-annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. G. P. Rogers, 932 Graybar Building, New York, managing director.

The Week's News Quickly Told

Current Events That Bear
on the Course of Business

EUROPEAN governments are invited to form a federation or moral union by Aristide Briand, foreign minister of France, to have permanent officers under whose auspices regular meetings could be held for discussion of problems of mutual interest.

ALLIED Reparations Commission and the Dawes plan regime disband. Bank of International Settlements opens its doors and offers \$68,000,000 capital stock, the necessary ratifications of the Young plan having been obtained. . . . The last Rhine bridgehead occupied by the French army has been ordered evacuated.

PARITY with Great Britain's navy in 1937 will cost us \$1,100,000,000 for new ship construction, according to an estimate by the Naval General Board. . . . Premier Mussolini says that Italy will match France battleship for battleship. . . . Salt Lake City, the first of the 10,000-ton cruisers authorized in 1924, meets acceptance tests with speed of 32.5 knots. She develops 110,000 hp. and carries 10 eight-inch guns, but only 1½-in. belt armor. . . . Navy yards have discharged 2200 civilian workers since January, with the prospect of eliminating 3000 more unless ship construction or modernization is authorized before fall.

KEEL is laid for the first of 26,000-ton twin ships for Matson Line, to sail between San Francisco and Australia at 20.5 knots and to cut the present 19-day schedule materially. . . . Work laid out at Fore River plant of Bethlehem Shipbuilding Corporation for the next three years will aggregate \$270,000,000, and give steady employment for 35,000 men in the various contributing industries. . . . Introduction of "cabin" ships and improvements in quarters has seriously reduced number of first-class

passengers carried by the transatlantic lines.

BUS competition and use by railroads of buses and trucks for delivery auxiliaries and for alternative routes, will be investigated by Interstate Commerce Commission. . . . Northland Grayhound Lines, Inc., operating long distance buses, earned \$2.41 per share in 1929, vs. \$1.99 in 1928. . . . Baltimore & Ohio Railroad will spend \$1,000,000 on new freight facilities at Toledo, Ohio. . . . Monopoly of taxicabs by Philadelphia Rapid Transit Co. is not profitable. Cabs and rights were paid for in 7-per cent preferred stock, but net income is only 6 per cent on capital investment.

CARS sold and net earnings of General Motors in first quarter both come to about 75 per cent the corresponding figures, January to March of last year. . . . Ford production is at a materially higher rate than a year ago. Production at foreign plants is one-eighth the total. . . . Chrysler sharply reduces prices on certain closed models. . . . Tires in manufacturers' hands number about 13,500,000 (as compared to 16,300,000 a year ago)—about 70 days' production at the current rate. . . . Intisy, the most prolific rubber bearing shrub of Madagascar, is found by the Department of Agriculture to thrive in Florida and southern California.

AWARD for the most meritorious service to industry by a trade association was given the National Automobile Chamber of Commerce, which pooled 1700 patents for the mutual good of all manufacturers. . . . Suit has been filed against the Radio Corporation of America and others, under the anti-trust act, to determine whether pooling and cross licensing of some 3500 patents constitutes restraint of trade.

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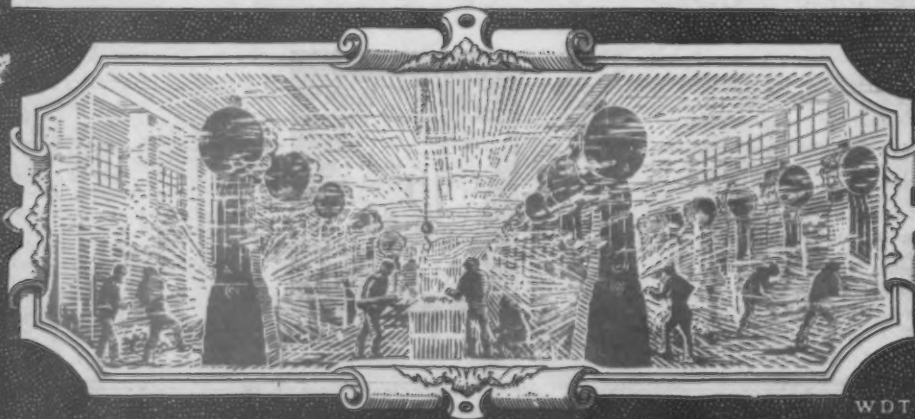
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